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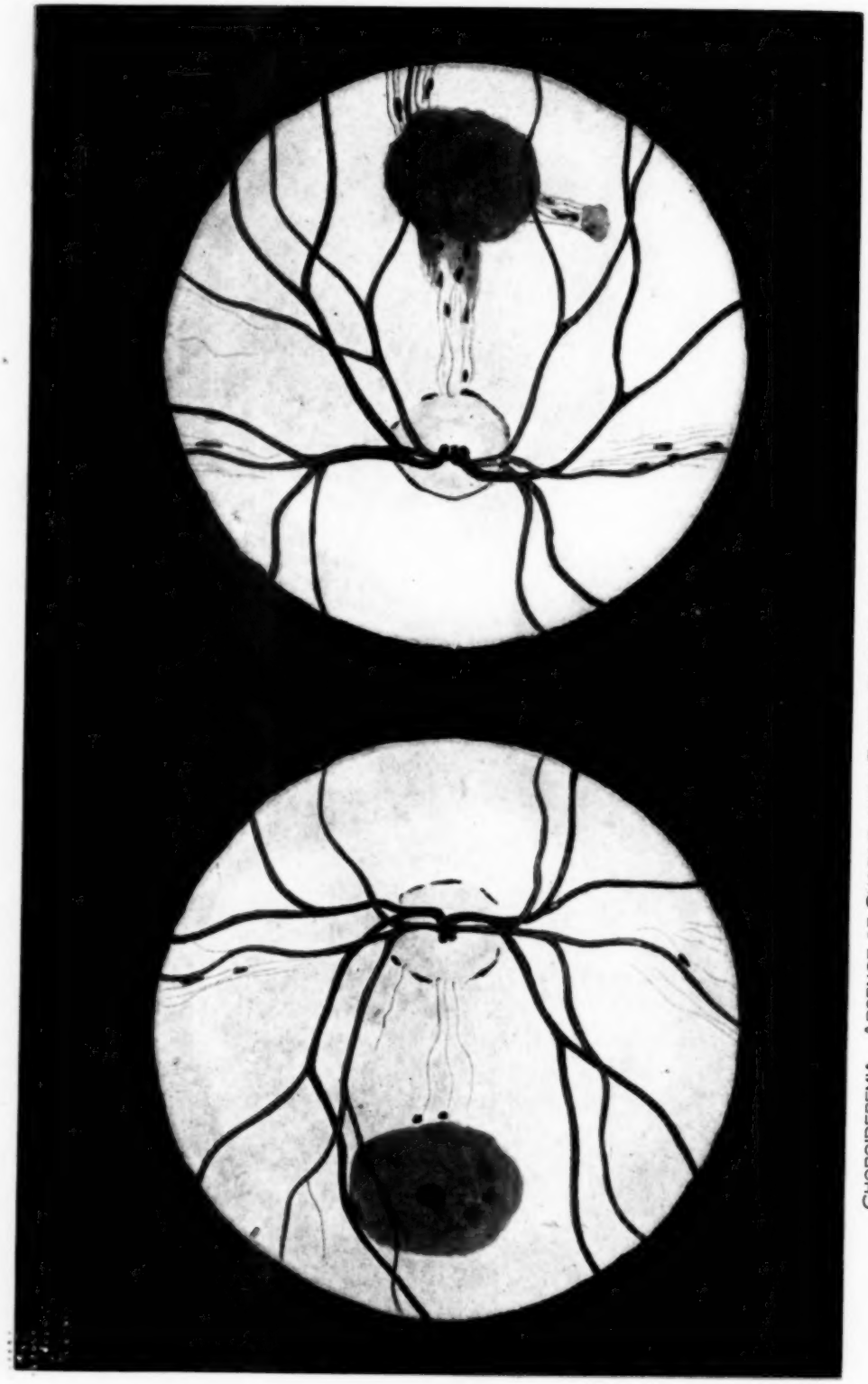

CHOROIDEREMIA. ABSENCE OF CHOROID OVER ENTIRE FUNDUS EXCEPT MACULAR REGION. (CONNOR'S CASE.)

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CONGENITAL CHOROIDEREMIA

A. B. CONNOR, M. D.

CHICAGO, ILLINOIS.

This case of absence of the entire choroid except in the macular area, observed by Captain Connor during his recent service in the Medical Corps in the United States Army, is of special interest because of the extremely small number of such cases hitherto reported. The circumstances under which this case was discovered indicate that they may be less rare than the reports seem to show.

On February 16th, 1918, Corp. C. B., Bat. B. 78 F. Art., came to the eye department of the Base Hospital at Camp Logan, Texas; complaining that he could not see to get about at night. Recently while on guard duty at night he had failed to recognize and salute an officer. As the bridge where the guards were stationed was over a deep drainage ditch, the soldier feared he would walk off some night and seriously injure himself.

Vision was tested with the regulation test type and found to be 20/20 in each eye. When told that his vision was normal, he replied, "Oh yes, I can see as well as anyone in the day time, but I cannot see as well as other people when it begins to get dark." This condition has existed as long as soldier could remember, eyes had never been sore and did not trouble him when he went to school. He had formed the habit at home of not going out much at night, unless some relative or friend went with him.

Patient twenty-five years old, a strong, well-developed soldier. Before entering the Army he did clerical work without trouble to his eyes. Personal history negative, not sick since childhood, thinks he had measles when six or seven years old, not very sick and does not think eyes were affected, denies venereal infection.

Parents both living and well, not related. One sister and one brother, living and well, none dead. No other case of night blindness in family that he knew of, and none have any form of eye trouble except one uncle on mother's side had repeated attacks of sore eyes. Says uncle had been ordered to wear glasses, but he does not think eyes were benefited by their use.

Examination shows lids and conjunctiva normal—pupils equal and respond to light and accommodation, iris normal and dark brown color.

Ophthalmoscopic examination shows cornea, lens and vitreous clear, but the picture presented by the fundus is most striking. Instead of the red fundus reflex usually seen, the examining eye encounters a glistening white fundus over which the larger retinal vessels appear about normal in size and distribution, (as shown in Plate XII). The sclerotic is exposed to view over the entire fundus, except a circular area about twice the size of the disc in the macular region. In this macular area the appearance of the fundus is normal, having the normal yellowish red color. The macula shows as a slightly darker spot in about the center of this patch of normal fundus. Scattered about the fundus are a few small ciliary vessels, and a few pigment spots. Both eyes are affected in the same way and present practically the same ophthalmoscopic picture, except that the left macular area is less regular in outline than the right, the latter

having choroidal vessels extending out from it, toward the disc and below.

Altho the retinal vessels appear entirely normal the retina itself is not properly developed over the white area, as shown by the markedly contracted, field of vision (Fig. 1) which accounts for the symptom "night blindness," of which patient complains. The color fields are correspondingly contracted, the red and green having their normal relation. Both eyes are one-half diopter hypermetropic.

In looking up the literature on anomalies of the choroid, the writer was able to find only one allusion to this peculiar choroidal defect recorded—

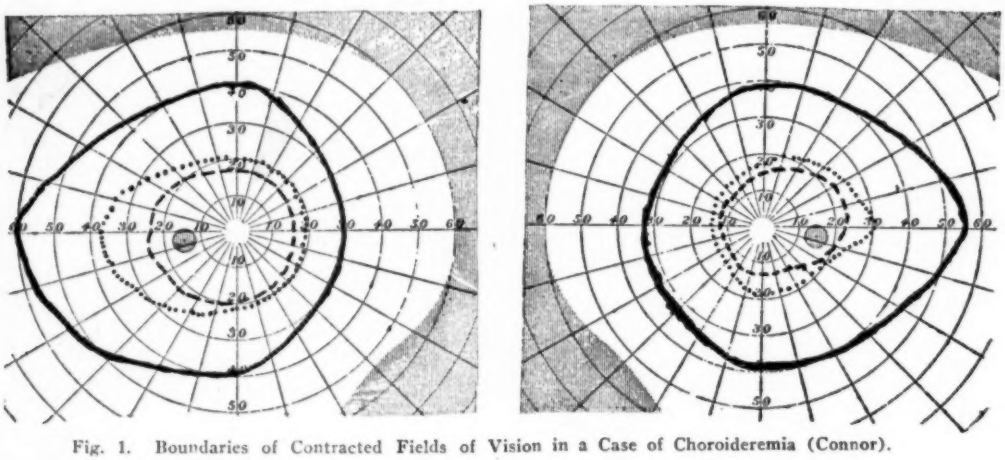

Fig. 1. Boundaries of Contracted Fields of Vision in a Case of Choroideremia (Connor).

that by the English ophthalmologist, the late Nettleship. A copy of Nettleship's original article was not available, but in de Schweinitz' book "Diseases of the Eye," we find: "A striking developmental abnormality is one in which the entire choroid except a small area in the region of the macula is absent. To this condition the name choroideremia, has been given. Both eyes are affected. The patients are night blind." (Nettleship.)

From the brief description from Nettleship's paper it will be seen that the lesion and symptoms presented by other cases were identical with those of our soldier.

The question naturally arises as to whether this condition called choroideremia is in reality a condition separate and distinct from the more common defect of the choroid, coloboma. Is the former dependent upon different etiologic factors, or is it simply an unusual form of coloboma?

Fuchs, in discussing the cause of coloboma, attributes the defects in the choroid to nonunion of the edges of the retinal cleft.

Wm. Lang calls attention to the fact that a failure of the retinal cleft to close, would not account for those colobomata which are covered with retina. According to Lang the explanation of all congenital defects of the choroid, wherever situated, is the same, an adhesion forms between the developing retina and mesoblast, which latter consequently fails to become differentiated into choroid and sclerotic. If the adhesion occurs before the closure of the retinal cleft, the coloboma is devoid of retinal covering; if it occurs after the retinal cleft has closed the coloboma is covered with retina.

The retinal fissure begins to close at its posterior extremity, the closure extending forward along the under surface of the optic stalk and optic vesicle, until the cleft should be completely closed by the second month of fetal life. This development may be arrested at any stage, hence the shape

of the typical coloboma is more or less triangular, situated in the lower segment of the fundus with the apex toward the optic disc, and broadening out as it extends forward toward the ciliary body. It may involve the ciliary body, iris and lens in this region, producing coloboma of these structures as an associated condition.

Whether or not colobomata of the choroid are due to adhesions between the blastodermic membranes as considered by Lang, it is certainly true that they usually occur along the line of the optic cleft and correspond to the general shape of this cleft during the various stages of its closure, so that we must consider their etiology as at least associated with the development and closure of this fissure.

The exception to this rule is found in those rare forms of coloboma which occur in areas of the fundus, remote from the region of the cleft, of which macular colobomata are examples.

In macular coloboma there is an absence of the choroid in the region of the macula, while in choroideremia, just the opposite is found, the macular area being the only part of the fundus which is supplied with choroid.

From the foregoing it will be seen that the lesion in choroideremia differs widely in location and extent from coloboma of the choroid; and it is not unreasonable to suppose that it has a different etiologic foundation.

The analog in embryonic life of what is later the macular area of the fundus is a spot on the outer surface of the secondary optic vesicle, where the first signs of differentiation of the mesoblast into sclera and choroid are seen, the first appearance of the choroid being manifest by a tiny plexus of capillaries at this point. Hence, in seeking an explanation of the cause of choroideremia, we must consider that differentiation of the mesoblast, of the secondary optic vesicles, into sclerotic and choroid, began in a normal way and at the normal point, but for some reason was arrested when only the macular area was supplied with choroid. [For references see p. 620.]

THE EYES OF THE SIGNALMAN

ALEXANDER DUANE, M. D.

NEW YORK CITY.

This paper, by a scientific investigator who has had practical experience as a signal officer, is especially valuable for its coordination of the scientific and practical aspects of the subject. It was read before the American Ophthalmological Society, June 14th, 1919.

These observations are based on a two years' experience in charge of the signal bridge on the U. S. S. Granite State. During this time I had the opportunity of testing practically the ability of some two hundred men in making and reading signals. A hundred of these served on the bridge under my direct supervision, so that I could judge, by actual observation of their work and of the behavior of their eyes under active service conditions.

The relation of ophthalmology to naval signalling may be studied under two aspects.

1. What are the visual qualities required in order to carry on the delicate and important work of signalling at sea?

2. What is the reaction of the eye to work of this sort, i. e. what pathologic effects may result from the visual strain involved?

The first question alone will be considered here, since with rather extensive opportunities for observation, I have had no occassion to note any untoward effects from naval signalling.

To answer either question intelligently, we must consider:

1. The character of the work to be done; i.e., the types and methods of signalling employed.
2. The conditions under which the work is done.
3. The consequent demands made on the separate functions of the visual apparatus and the nervous system.

TYPES AND METHODS OF SIGNALLING USED.

The main methods used in naval signalling to-day are:

1. Flag hoist.
2. The hand semaphore.
3. Flash light, blinker and search light.

Other methods, like the Ardois, the wigwag, the Very system, the machine semaphore, and signalling by shapes, are either disused altogether or are used so rarely as not to require any special consideration.

To the requirements involved in these forms of signalling must be added those demanded by other duties of men on the bridge, including their work as lookouts.

FLAG HOIST. The flags used in the navy are the following:

1. International flags, 27 in number. Used both in international and navy signalling, but by entirely different codes, with both of which the signalman must be familiar. (I may point out that our men were also taught the English code, in which the same flags are used with still a different meaning).
2. Special navy signal flags, 16 in number.
3. Personal flags, from the president's flag, down to the commission pennant (captain's flag) and distinguishing flags of different branches of the service (coast guard, army transport, etc.). There are some 42 of these; or, including foreign ones, at least 60.
4. Ensigns and jacks of the United States and other nations. There are a great many of these, but 30 are commonly seen.
5. Call flags and call pennants, 46 in number.
6. Special English signal flags, numbering 35.

In other words, a man on the bridge has to be able to recognize and know the meaning of more than 200 different kinds of flags, of which 125 are in very frequent use.

The flags differ in shape and in color. In shape they are either square or oblong (called then collectively square flags, or simply flags); swallow-tailed (burgees); or triangular (pennants). The last are either very elongated, as in the commission pennant; moderately acute (twice or three times as long as broad); or equilateral, as in the senior officer's pennant. The colors found in flags are white, black, red, blue, yellow and green. The last is rare, being found in only one signal flag and in the ensigns of Italy, Portugal, Mexico, Bolivia and Brazil. Black occurs in three international and a few English signal flags and in the ensigns of Belgium, China and the central empires. The yellow used is a sort of sulphur color; the red is the hue of the stripes in the American ensign, or somewhat darker; the blue in American flags is the dark navy blue, in French flags a blue, lighter and therefore much more conspicuous.

The shape of a flag can be made out much further than can its color, and may by itself serve to distinguish the signal. Thus a burgee flying on an American man-of-war or merchant vessel must be either the international A or B, and, as the latter is a solid dark color (red) and the former a combination of light and dark (white and blue), it is easy to tell which flag it is, even if the actual hues in each cannot be distinguished. So too, it is always easy to make out the commission pennant, because no other flag has its whiplike shape.

If, however, a flag is fouled or is flapping a good deal, it may be hard to tell its shape, and then flags, otherwise alike, (international E and T, international G and K), may be mistaken for each other.

Another help in distinguishing the flag is its situation. Thus a flag flying at the flagstaff at the stern must be the ensign, and if it has another flag above it in the same hoist, the latter must be the church pennant; a dark flag flying in the bow must be a jack, while

a dark flag at the main truck must be the personal flag of a rear admiral or superior dignitary (vice admiral, admiral, secretary of the navy, president); a dark pennant flying at the forward yardarm must be the meal pennant, while one flying at the after starboard yardarm along with a commission pennant at the truck must be the flag of the senior officer present.

But with all these helps the main thing after all by which we distinguish the flags from each other is their color. In this respect they leave much to be desired. This is partly due to the impossibility of making up different sufficiently distinctive color patterns for all the 200 or more flags used; but it is also due to poor choice of hues. The reds, brilliant at first, become too dark when the flags grow dingy (as they soon do); and in American flags, even when new, the blue is much too dark. Both colors, especially the blue, contrast but little with a mixed background (military mast, smoke-pipes, or land); and the blue at a little distance looks black and is often hard to make out at all. To see how the hue we use interferes with visibility, we have only to contrast American and French admiral's flags flying on neighboring ships. The light blue of the French is distinguished as a color twice as far as the dark blue of the American; and the flag itself is seen further as a flag, because contrasting better with the average background.

On the other hand, the yellows used are sometimes either too light or insufficiently saturated, so that against a sunlit sky they look white and are not very clearly distinguishable.

The poor coloration is particularly noticeable in our call pennants, which are used for calling individual ships to receive a message. These are made up of blue, red and yellow bands, arranged to denote letters by the dot and dash code (red representing a dot, yellow a dash, and blue repeating the color immediately preceding). The blue is too dark, the blue and red when in juxtaposition afford too little contract, and under some conditions the yellow is too light. If the blue were decidedly lighter, the red had more yellow in it, and the yellow were darker, the pennants would be much easier to read.

Flag signals are intended to be hoisted rapidly and read instantaneously. The ability to read them instantaneously is absolutely essential in battle signals and in all maneuvres; hence the men are drilled, to vie with one another in making, reading and answering such signals with the greatest possible speed. And even in ordinary work it is highly important to be able to recognize the flags quickly at a distance. For example, when a warship comes into port, it flies its identifying flags or "call" (international, naval, or both) and usually another signal, which requires immediate answer, such as the four flag hoist meaning "May I anchor in berth assigned?" The signalman on the flagship must be quick to read all these flags, so as to identify the incomer and, in the few minutes before it can reach its berth, report it and hoist the "Permission granted" signal.

With rare exceptions, messages sent by flag hoist are code messages: i.e., each hoist denotes a word, phrase, or entire message.

SEMAPHORE. In the hand semaphore (of which the machine semaphore, still used by the English, is a variant), an alphabetic or spelling code is used, the separate letters being indicated by the position of the arms extended at different angles. Thity different positions must be distinguished. Ordinary messages are sent at the rate of 18 to 20 words a minute, but a man has to be able to read at the rate of 25 words a minute, and the practiced hands can read 30 words a minute or more. We derive our semaphore from the English, who are past masters at it. The French also have a semaphore, differing from ours and, indeed, better in some respects, being more legible and easier to make out. In our work during the past two years, we had some occasion to be concerned with this, as we had frequently to do with French as well as with English vessels. [The Dutch have still another variety.] In the wigwag, whose use is also practically

confined to sending spelling messages, each successive motion denotes, not an individual letter as in semaphore, but one of the dot and dash elements composing a letter according to the international Morse system. It consists simply in swinging a staff with a flag on the end either right, left or straight forward from the vertical position, a right swing denoting a dot, a left swing, a dash, and one to the front, an interval. As it takes, on an average, three motions to make a letter, and as the motions themselves cannot be made as fast as the changes of position in the semaphore, wigwag is about five times as slow as the latter. On the other hand, it is much more legible, since it is obviously a good deal easier simply to tell whether a motion is being made to the right or the left than it is to make out one of 30 possible positions made with the extended arms for only the fraction of a second. Hence the wigwag is used in landing parties or under other conditions when the distance is too great for semaphore and the searchlight cannot be employed. (A very effective, readily visible and readily legible form of wigwag is the torch and the hand lantern. These swung with the extended arm make an arc of light standing out clearly against the darkness. The movements, of course, are the same as with the flags.)

SEARCHLIGHT. This in the form either of the powerful searchlight, the flashlights on the yardarm (yardarm blinker), or the hand-held blinker tubes, is the regular method of signalling by night and is getting to be more and more used in the daytime also. The light is interrupted either by a make-and-break key in the circuit or by a shutter, and long and short flashes, corresponding to the dots and dashes of the continental Morse code, are thus made. The code and method are common to all nations, and we have repeatedly signalled by this means to French and Chilean, as well as to English and American ships.

This method has the great advantage over the others that signals sent by it can be read very much further and are not as much affected by weather conditions. It is, however, the most difficult of all methods, and proficiency in it is secured only by long and steady practice. It demands close concentration of sight and mind, and undivided attention. Practice during the first weeks is attended with visual and mental fatigue, so that the sight blurs and the mind wanders. With most persons this difficulty passes in time, altho men vary extremely in the rapidity with which they learn. Some few, mainly it would appear from lack of concentration, never get to be good searchlight readers, although they do well enough at the easier semaphore. In some of these cases it is possible that a refractive or muscular error had something to do with the disability, but my observations incline me to believe that it is due rather to mental inertness or nervous instability.

LOOKOUT DUTIES.

The man on the bridge is supposed to keep constant lookout. Altho the navy now divides quartermasters' duties, so that the ship's quartermaster does lookout work and the signal quartermaster confines himself to signals, yet in many cases the signal quartermaster has to attend to both. In any case he has to be capable of attending to both. He must then under all conditions of weather and visibility, make out, and make out at a distance, so as to report promptly, the rigs and distinguishing marks of all sorts of craft from a battleship to a motor launch, the insignia or flags that they carry, the various kinds of lights and shapes borne by ships to indicate what they are and what they are doing, and a great number of other things requiring mental alertness and quick and keen eyesight.

CONDITIONS WHICH AFFECT THE SEEING OF SIGNALS.

Even in good weather and with a clear atmosphere, signal work often makes high demands on a man's attention, his acuity and tenacity of vision, and his nerve control. A signal man must be able to keep his attention con-

centrated and his eyes glued on the sender, no matter what interruptions or distractions may occur, and particularly he must not lose his head if a word or symbol escapes him here and there. The tyro, no matter how well drilled, is apt to get excited when he is first put at doing real work on the bridge. If he misses a word, he goes to pieces and loses the whole message. Or his attention flags and he gets into a sort of daze, so that the symbols, especially the quickly alternating flashes of the searchlight, fail to make any impression on his mind. All this is due, of course, rather to lack of mental control than to real visual disability. Yet visual defects also play a part, either by making the signal so indistinct that it cannot be read at all or by making it so hard to see that the attention is strained to the utmost and gives out even sooner than it ordinarily would.

Quite the same is true of attendant conditions that make the perception of signals difficult. The conditions, then, that affect the perception of signals may be divided into, first, those that concern the visibility of the signals themselves; second, those that concern the visual ability of the receiver.

CONDITIONS AFFECTING THE VISIBILITY OF SIGNALS.

1. DISTANCE.—The maximum distance at which signals can be seen varies greatly with the method used, with the conditions under which the signal is seen (illumination, state of atmosphere, background), and with the experience and visual ability of the receiver. The maximum distance at which a man with good sight and working under favorable conditions can read signals with the naked eye for semaphore is one-third to one-half mile; wig-wag, one to two miles (depending on size of flag used); wig-wag torch, two to four miles or more; flag hoist (for flags of battle-ship size), half a mile (more for some flags); blinker light, three or four miles; searchlight, practically any distance.*

For flag hoists, wig-wag, and semaphore, these distances may be doubled or even tripled by the use of binoculars or telescopes, provided the weather and other conditions are such as to render these aids available. Binoculars do not in general help in distinguishing blinker or searchlight, except occasionally in the daytime when they are drowned out by excess of light.

Distance affects not only the definite form, but the distinction of color—blues tending to look darker and ultimately black, and yellow lighter and ultimately white.

The attempt to read signals at maximum distance requires, of course, strict attention, and, if maintained for any time, may strain the visual power to the point where it gives out.

ILLUMINATION AND BACKGROUND.—For semaphore, wig-wag, and flag hoist, bright daylight with the sun shining on the object and a clear, all-round sky background make the ideal conditions. Seldom are these attainable. The light is often poor. When it diminishes greatly, both form and color perception are affected. In dusk, for example, the semaphore letters may not be distinguished more than two or three hundred yards at best, and both form and color of flags become illegible. Theoretically, as the light diminishes, the red should appear darker and the blue lighter, so that one might suppose that the color value contrasts would enable us still to distinguish the flags. This is not the case. The blue and red of our signal flags are such that with diminishing light both tend to look black. Another ill effect of reduced illumination is that for long distances binoculars no longer aid the

*Theoretically, flag signals should be seen twice as far as this, and semaphore half as far again. But, owing to the fact that under the best of working conditions the semaphore background is not ideal, and that flags are never blown out perfectly straight nor against a properly contrasting background, the distances are about as stated.

I may add that very erroneous statements are made in this regard, especially by men in the service. Misled by them, I made some gross exaggerations in my article on Sight and Signalling in the Navy, read before the American Philosophical Society.

vision. In fact, one sees better without them.

On the other hand, the light may be too bright. The sun shining behind a man semaphoring or a flag hoist or a searchlight drowns out the signal and, in the case of a flag hoist, makes the shape uncertain and the color indistinguishable. It may also so dazzle the receiver that he cannot keep up the effort of reading the signals. The same is true of the very bright searchlights now used, if the observer is too close to them.

A complete sky background is rarely secured. In semaphore and in wigwag this factor counts immensely. Semaphore hand flags held below the waist line, as in making the letters A, G, H, I, L, X, and Z, are nearly always backed by some object on the bridge and very often in all positions are obscured by masts or smoke pipes, so that they hardly show at all. The same is true of flag hoists when, as often happens, they are backed by a cage mast, by the shore, or by smoke.

Under the service conditions ordinarily prevailing, the illumination and background, particularly the latter, are more important for the legibility of a signal than is the distance at which the signal is situated. This fact has a special bearing on the visual qualifications that we should demand of the signalman himself. The best signalman, in fact, is not necessarily he who can see the farthest, but he who can discriminate most readily slight differences in contrast between signal and background.

3. Atmospheric Conditions.—Haze, rain, or snow obviously make signals of all kinds indistinct in proportion to the intensity of the obscuration that they cause; and, moreover, as in the case of diminishing illumination, give trouble because even a moderate obscuration due to these factors renders binoculars useless.

4. Wind.—Unless a ship is under way, a certain amount of wind is needed in order to blow out the flags in a hoist and make them distinguishable. Many of the flags, to be sure, and especially the call-flags and most of the international flags are so patterned as to be distinguished if even only a small portion shows, and men get quite adept in recognizing them when hanging limp. The call pennants, on the other hand, must as a rule be seen in their entirety to be recognized, so that they need some wind to blow them out. A wind blowing straight toward or away from the observer is as bad as no wind at all, and a very gusty wind, which makes the flags flap or foul, is also an obstacle to clear reading. It also interferes greatly with the use of a binocular or telescope, both being hard to hold steady in a strong wind, and the object swaying as the glass does, only three or four times as much.

Incidentally, a sharp wind blowing right into a signalman's face may suffuse his eyes with moisture and thus blur the signals at a critical moment.

5. Motion of the Ship.—This interferes very considerably both with sending (especially with the semaphore), and with receiving. It is particularly troublesome when binoculars are used, as the latter, of course, magnify every movement.

6. Faulty Technic.—This is one of the most prolific causes of difficulty in making out signals. The careless sender in semaphore chooses a bad background and makes his angles badly, so that his letters cannot be distinguished; and with the searchlight runs his dots together, uses a faulty rhythm, or omits spaces between words. These are a few of the defects known and reprobated on the bridge. They diminish legibility to a very marked degree and, to that extent, impose additional visual strain on the observer.

7. Use of Binoculars and Telescopes.—A glass is indispensable on the bridge for reading semaphore beyond a third of a mile or flag hoists beyond half a mile. The ordinary glasses double or triple the distance at which signals can be read. On some of the ships powerful telescopes are mounted, with which flag hoists and semaphore can be seen much further. But glasses, and especially telescopes, are hard to use if either the sending

or the receiving ship is rolling, or if there is a high wind, or the weather is wet. A mounted telescope naturally is applicable only when the ship is fairly still. In a mist or at dusk, as before remarked, objects cannot be seen any better with a glass than with the naked eye—usually not as well.

Generally speaking, any condition that interferes with the use of a glass is troublesome in proportion to the power of the latter—a fact which limits the use of glasses under service conditions to comparatively low powers.

CONDITIONS AFFECTING THE SIGNALMAN HIMSELF.

From the above description it is evident that the signalman has to make out instantly and with precision a great variety of objects and a number of variants of the same object, differing either in form or in both form and color, and has also to distinguish light flashes, varying in length and sequence and recurring with great rapidity, and that he must do these things under the most varying conditions of light, shade, background, and weather. Add to this the fact that his work is often carried on under conditions of high tension, hurry, and great responsibility, and we see that the service makes great demands on the visual acuity, the color sense, the light sense and adaptation, muscular coordination, nervous energy, and physical endurance. The relative importance of each of these factors will now be considered.

1. VISUAL ACUITY.—Considering the work that a signalman has to do in the recognition of distant objects, the Navy requirements of 20/20 vision for each eye without glasses, seem none too severe. If in selected cases glasses are allowed—and I should be in favor of allowing them in such cases—the vision with them ought not to be less than 20/20, each, and it might be well to require 20/15 in at least one eye.

Only in very exceptional cases should a man be allowed to serve on the bridge, whose vision without glasses is less than 20/30 in his better eye and less than 20/40 in his poorer eye.

Nevertheless, I am persuaded that visual acuity, per se, at least as we test it with our charts, is not the most important of the visual factors. For it does not by itself measure the ability to recognize far distant objects when seen under the conditions that prevail on shipboard. More important in this regard is the light sense. To this point we will recur presently.

2. REFRACTION AND THE USE OF GLASSES.—No signalman should have any very high degree of ametropia. Myopes of any considerable degree are, naturally, excluded. Hyperopes also may have to be excluded if their error is so high as to make us fear that the accommodation cannot always and readily correct it. In judging this we must remember that on the bridge the accommodation may be weakened by continuous nervous strain or by prolonged deprivation of rest and sleep. Under these conditions even a slight hyperopia may become an excessive burden and then either the vision blurs or the attention flags. Whether this is likely to happen or not depends largely on the signalman's physique and nervous stability, but unless these are exceptional he should not, I believe, have over 1 D. or, at most, 1.5 D. of uncorrected hyperopia. Probably about the same statement can be made with regard to astigmatism.

It is difficult to form a judgment on these matters, because refractive errors are not much in evidence on the bridge. Of the 101 men who from time to time served on the bridge of the Granite State, only 6 (5 besides myself) wore glasses. The remaining 95, having passed the Navy examination, had presumably 20/20 vision in each eye without correction. Of the men wearing glasses, two had two or three diopters of mixed astigmatism, but in the case of one, at least, this seemed to cause no trouble, as he was one of the best receivers on the bridge. The other (myself) had sometimes considerable difficulty in reading signals, but this was apparently due only in a very subordinate degree to the refractive error. Two of the other men had a moderate degree of hyperopic astigmatism. In one the refractive error seemed not to

interfere with his work either before or after he put on glasses. In the other, who had anisometropia besides, the refractive error may have had some effect in reducing his efficiency, especially in reading searchlight, but his difficulty may with more plausibility be ascribed to his very nervous temperament, which made him give way readily under strain. In the remaining three, one of whom was quite myopic, the refractive error had no apparent effect on their signalling ability, which was all that could be desired.

So far as such a small number of cases can prove anything, they would seem to indicate that refractive errors in themselves are no essential impediment to signal work. They would also indicate that the wearing of glasses is not incompatible with efficiency in this regard. Indeed, one would naturally suppose this to be the case, since signalmen on the bridge constantly use binoculars or telescopes, which are apparently liable to just the same objections as the spectacles that a man wears. Nevertheless, it cannot be denied that under such conditions as prevail on the bridge spectacles are a real inconvenience. They produce disturbing reflections. They readily become dimmed with moisture or marked with grease, and even when clean apparently cut off enough light to render the recognition of faint distant objects more difficult. Nor is the improvement produced by glasses in distant vision at all comparable with that obtained with the same glasses when looking at an object at twenty feet. This is a fact that our patients often insist on, and I think we should give it more heed than we are apt to do. In my own case, my vision with glasses is 20/20 and without them is about 20/40. Yet under nearly all conditions of distant vision, I can make out far away flags, semaphore signals, etc., almost, if not quite as well, without my glasses as with them.

My own judgment on this matter is that, always making exception of the specially qualified men, no one should have a place on the bridge who cannot see distant objects (but not, of course, the ordinary test-card), as well without glasses as with them. If he can do this and has by the test-card 20/20 with his glasses and at least 20/40 without, he may be placed on the bridge, and may then either use his glasses or not, as he wishes, altho he should be encouraged to do his signalling with them.

3. Color Sense.—On the great importance of a keen color sense, there can be no difference of opinion. So many of the flags require for their recognition quick and accurate color discriminations (between shades, often, of about the same light values), that a man who is deficient in this regard would be unserviceable for signalling. Equally important is the ability to distinguish colored lights, particularly the green starboard and red port light of a vessel under way, and the combinations of red lights which distinguish pilot vessels, fishing vessels, cable ships, and various other vessels of special character.

4. Light Sense and Adaptation.—Acute light sense and ready adaptation are essential qualifications of a signalman. It is indispensable that he should be able to distinguish readily a dark object against another nearly as dark, should make out colors, movements, and shapes against a background which affords but little contrast, and should see well in rapidly fading twilight and in murky weather. It is also important that he should be able to stand the glare of the sun, shining on the water, or behind the signal, or the powerful searchlight, without getting dazzled or fatigued.

Bridge work and especially the reading of searchlight signals, in which bright light flashes of light alternate with darkness, require quick adaptation and a mobile pupil.

Compared with a good light sense, visual acuity is of subordinate importance, and for that reason our visual tests, as ordinarily conducted, do not give the best idea of the availability of a candidate for bridge work. If we have no photometer with which the light sense can be measured accurately, the latter may be determined by tests

made under actual service conditions, i. e., by making the candidate pick up distant objects and describe their form and color, when viewing them under varying and especially under unfavorable conditions of illumination and background.

5. Motor Anomalies of the Eye.—I should say that these affect a signalman's efficiency to only a very subordinate degree. As vision is concerned altogether with distant objects, errors of convergence and accommodation cause no particular trouble. A man who has a tendency to diplopia at a distance in distant vision (e. g. from weak externi or from hyperphoria), may be confused especially in taking searchlight signals, and, of course, eyes so affected tend to give out sooner than do those that can easily maintain binocular fixation and binocular vision.

6. Reaction Time.—Nowhere, except in the turret or at the wheel is the slowly reacting man more out of place than on the bridge. On the bridge a man must be constantly on the alert for visual impressions of all kinds and coming from all quarters, must take them in instantaneously, realize their significance, and act on them without a second's delay. This means that he must be quick to react properly to any stimulus, whether signal, order, or question.

7. Mental and Nervous Stability.—The ideal bridge man is one who is neither stolid nor erratic, but one in whom quickness of body and mind and a superabundant energy are combined with steadiness under all conditions, an even temper, and a happy disposition. He is one that is quick and eager to learn, enthusiastic, in love with signalling, industrious, always amenable to discipline, yet always also capable of independent thought and action, and, above all, he is reliable.

A man who has these characteristics I would pick out for the bridge, even if he had some apparently prohibitive visual defects and refractive errors. He would, as I know, make good in spite of them. And a man of opposite characteristics I would not have, no matter what his vision. It requires a special disposition and aptitude of mind to be a signalman, and it is not worth while to try to train those who are either indifferent or unmanageable. The work is too important to be put into such hands.

Conclusions.—My observations have led me to the following conclusions:

1. The visibility and legibility of our signal and other flags could be much improved if the blues were made much lighter, the reds were made somewhat lighter, and care was always taken not to make the yellows too light.

It would also be better if the pennants had a rounded or obtuse, instead of a finely tapering tip, as this part of the flag becomes hard to read in proportion as it tapers down.

2. The ocular requirements that we should lay down for a candidate for signal work should always be considered in connection with his other physical and mental qualifications and to a certain extent should vary with these.

A like correlation between the strictly physical qualifications and the general mental and moral make-up of the candidate should, I believe, be made in the case of all candidates for military and civil positions. This is done now to some extent, but the principle might be extended with advantage. As I have elsewhere remarked, this correlation is best affected if the medical officer who makes the physical tests and the professional expert, who gauges the probable availability of the candidate from a technical standpoint, work hand in hand.

3. In making such a correlation, we must distinguish between the visual requirements, which, being indispensable for the purpose in hand are necessarily inflexible, and those in which more latitude may be allowed.

4. For signalling the ideal visual requirements are: Visual acuity of 20/20 in each eye without correction; perfect color sense; first-rate light sense and quick adaptation; orthophoria for distance and near, with good converging and especially with good diverging power; quick reaction time.

5. Of these requirements three are indispensable, viz., perfect color sense, first-rate light sense, and quick reaction time. Coupled with these there must be a good all round physical condition.

6. To test these matters out in a practical way, I would first take each applicant's vision; examine his color sense with the lantern and with other tests, of which, I think, the most available are Nagel's and Stilling's; if a photometer could be had, I should measure his light sense with it, and, if I had no photometer, would test out the light sense by making the applicant pick up faint distant objects under difficult visual condition; I would apply some simple psychologic tests to ascertain his reaction time and quickness in making mental discriminations; and would determine his muscle balance for distance and near and his converging and diverging power.

Those who showed deficiency in color sense or light sense, were markedly slow in their reactions, or were evidently below par in their physical and mental vigor, I would reject at once. The rest I would place in a signal class, conducted at first below decks, later on the upper deck and on the bridge.

7. Of the men so placed, I would put those with subnormal vision or abnormal motility in a probationary class. While they were in this I would ascertain the cause of their deficient sight, and if it was due to a refractive error would correct it.

8. Those of the signal class who displayed marked enthusiasm and readiness in learning, and steadiness and reliability in their work coupled with the ability to discern far distant signals or objects under all sorts of service conditions (especially when the contrasts were poor), I would admit to permanent service on the bridge even if their visual acuity was not up to the full standard. I should even think it proper in the case of specially good men to take them on even if their ametropia was such that uncorrected vision was 20/40 or less, so that they could not see distant objects by any means as well without their glasses as with them. Such men, of course, would have to do their work on the bridge with glasses, which, after all, are only a relative handicap.

On the other hand, no matter how perfect his vision was and no matter how technically well-fitted he seemed, I would not have a man on the bridge who showed in the preliminary work in the signal class that he was erratic or quarrelsome, or who did his duties carelessly, perfunctorily, or reluctantly, or who was unreliable.

In fine, my idea is that the initial physical examination should be more or less elastic and tentative, eliminating simply those who are absolutely unfit, but admitting to further trial under service conditions all the other applicants, whether visually below standard or not; and that when this further trial has disclosed what each man's visual, mental, and moral qualifications are, the signal officer with, if necessary, the aid of the surgeon shall determine which of the men under investigation are fit for duty on the bridge.

THE ORGANIZATION AND ACTIVITIES OF THE OPHTHALMIC SERVICE IN THE AMERICAN EXPEDITIONARY FORCES

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This may be regarded as an authoritative history of the ophthalmic service in the American Expeditionary Forces, as complete as can be offered at the present time. It was presented before the Section on Ophthalmology of the American Medical Association, June 11th, 1919.

Early in May, 1918, a senior consultant in ophthalmology was obtained for the A. E. F., and the following is a brief summary of the organization of the ophthalmic service in the A. E. F. and a partial record of its accomplishments. As a result of the work and observations of the senior consultant and his assistants, suggestions for the future are incorporated in this report.

The whole can best be presented under several headings:

1. PERSONNEL AND EQUIPMENT

A review of conditions found in those hospitals of the A. E. F. which were visited by the senior consultant in May and June will give the best idea of conditions pertaining to the late spring and early summer:

1. *Base Hospital* 15, *Chaumont.*—Lieut. (now Capt.) G. H. Grout was in charge of a small eye clinic, which was combined with that of the ear, nose and throat. His equipment was very meager, there being no magnet, no army eye case and no auxiliary case, while the space at the disposal of the eye department was totally inadequate for the purpose. After conference with Lieutenant Grout and the commanding officer, a room was selected for the occupancy of the optical unit; and the east end of the lower half of the Baudens Pavilion was selected for an eye ward, reserving the three end rooms for the clinic and operating rooms. Later, two magnets were secured for this clinic and full instrumental equipment, thus making a very efficient eye center, which was kept constantly busy during the rest of the summer and fall. After the work had increased, an assistant was assigned to Captain Grout. The suggestion was made to Captain Grout and the commanding officer that a nurse who had had some training in eye work should be assigned to Captain Grout's clinic as the permanent nurse in charge. This same suggestion was made in all of the base hospitals where it was thought practicable in order that soldiers with diseased and injured eyes could have *experienced* nursing service at all times. It has been found that a rotation of nurses in the eye service is detrimental.

2. *Base Hospital* 18, *Bazoilles.*—Lieut, (now Capt.) Lloyd B. Whitman was in charge of the eye work. He had a small clinic and his patients were scattered. His equipment was found to be very meager and steps were immediately taken to bring about improvements in view of the projected development of a large center at Bazoilles. A large and small Lancaster magnet were secured and a full instrumental equipment. A section of a ward was assigned for the eye cases and rooms set apart for an eye clinic and one for an optical unit. Later in the season, one of our most efficient eye centers was organized at Bazoilles under the charge of Captain Whitham, but owing to the lack of available space at Base Hospital 18, one of the newly erected buildings at Base Hospital 46 was selected to be rearranged according to plans furnished by the senior consultant. These plans were sent to the office of the chief surgeon for approval and also sent to the other growing hospital centers, similar to Bazoilles.

This center performed most efficient service thruout the trying period of the fall offensive. Several of the ophthalmic surgeons in the surrounding hospitals came to the center to assist Captain Whitham with the work. Capt. H. B. Chandler, of Base Hospital 116, was especially helpful. The optical unit was also transferred to Base Hospital 46 and from this base supplied the Toul area and

Base Hospital 66, as well as the Bazoilles area. It established itself as one of the most active and efficient of our optical units. A number of special operations were performed at this center by the senior consultant in ophthalmology and by the assistant consultant.

3. *Base Hospital 36, Vittel.*—The eye clinic here was in charge of Capt. W. B. Haughey, who had the best and most complete equipment for ophthalmic surgery of any of the then active American hospitals in France. This equipment was brought with Base Hospital 36 and *illustrates the great advantage of having each base hospital transport its own special equipment.* Two Lancaster magnets were found installed and a room devoted to the use of the eye clinic. Base Hospital 23, which was in close proximity to Base Hospital 36, also had an eye clinic, but without adequate equipment for ophthalmic surgery. An optical unit was, however, first assigned to Base Hospital 23, in a room provided for it, as most of the refraction work was being done here. Later Maj. J. M. Patton was assigned to Base Hospital 36 to take charge of the eye work and organize an eye center for the Vittel and Contrexeville area. Several rooms at Base Hospital 36 were assigned to him in which to locate a central eye clinic, as all such work, including refraction, was now to be carried on here, and a room was also set aside for the optical unit transferred from Base Hospital 23. Major Patton was made consultant for the combined Vittel and Contrexeville areas and most of the serious operative work was routed or transferred to his clinic. This plan of centralizing the eye work for the area under the consultant at Base Hospital 36 worked out most admirably, and a great deal of praise is due Major Patton for the efficient manner in which he built up this center, which, with the special wards placed at his disposal, soon became one of the most active ophthalmic centers in the advanced area.

4. *Base Hospitals 31 and 32, Contrexeville.*—While these hospitals were not thoroly equipped for the more extensive operative work, they were sufficiently equipped and had the officers to carry on the ordinary routine ophthalmic work of base hospitals, but with the formation of the center at Vittel the more complicated ophthalmic work could be transferred there.

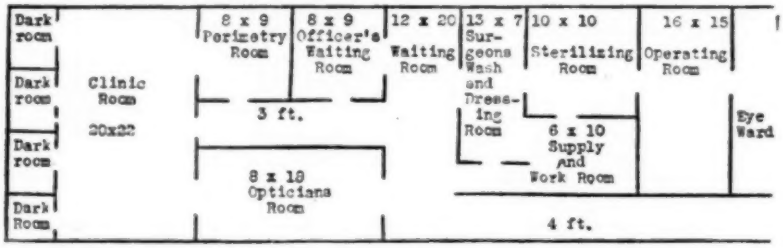

Fig. 1.—Arrangement of eye clinic rooms at Base Hospital 46. Three dark rooms across end of clinic rooms has been found a more practical arrangement than four for this width of building.

5. *American Red Cross Military Hospital 1, Paris.*—A visit was made to this hospital May 20. Lieut. (now Capt.) A. B. Fewell was carrying on the ophthalmic clinic with skill and energy. He had a very good equipment, including a giant magnet. Later, a small hand magnet was provided to complete the equipment of magnets. During the early part of June, after the battle in which the Second Division figured so bravely, a good many operations were performed in this hospital by the senior consultant and the assistant consultant to demonstrate various approved methods of handling ophthalmic battle casualties. Still later, Capt. F. W. Shine was assigned to this hospital and was made consultant for the Paris area. Thru the kindness of Colonel Hutchinson, the commanding officer, a good sized ward was set aside for ophthalmic cases, with

a well equipped operating room adjoining. Here Captain Shine and Captain Fewell performed many sight-saving operations and also a good many lid plastics. The work at this hospital had been fairly heavy from the start of the American offensive and had been carried on most efficiently.

6. *American Red Cross Military Hospital 2, Paris.*—This hospital was also visited May 20; and while it is a small hospital, it has been a very active ophthalmic center, due to the energy and ability of Lieut. W. B. Doherty. This has been one of the very bright spots ophthalmologically in the A. E. F. All of the operative work performed by Lieutenant Doherty was of very high order, and he had a splendidly equipped ophthalmic clinic, with the single exception of having no magnets, but with A. R. C. Hospital 1 so near, the magnet work could all be transferred there. Lieutenant Doherty has done more refraction work than most of the other ophthalmic surgeons in France and has fitted probably a larger number of artificial eyes, as all the difficult cases coming to the base optical unit have been referred to his clinic. He has fitted up his ophthalmic clinic with many admirable mechanical devices of his own making and has procured thru the American Red Cross many of the more intricate instruments not ordinarily furnished to base hospitals. Lieutenant Doherty's work has also been most highly praised by the assistant consultant in ophthalmology and by Lieut-Col. Nelson M. Black, one of our consultants in ophthalmology.

7. *Langres Center.*—The ophthalmic work here was in charge of Lieut. (now Capt.) Frederick Falk, tho all the operative ophthalmic surgery was transferred from here to Base Hospital 15 at Chaumont. Captain Falk was doing considerable refraction work in a small clinic in the center of the town and also some civilian work. This work was well carried on by succeeding ophthalmic surgeons, after Captain Falk was ordered away to join his unit.

8. *Base Hospital 66, Neufchateau.*—A visit to this hospital found Lieut. R. S. Beam in charge of the eye work, with a small clinic and a ward devoted to eye cases. He has carried on the work here up to the present with some help from the consulting ophthalmologists but the bulk of the ophthalmic surgery coming to this region was diverted to the eye center at Bazoilles.

9. *Evacuation Hospital 1, Sebastopool.*—A visit to Evacuation Hospital 1, which has really functioned as a base hospital, found Lieut. A. S. Rochester in charge of the eye work, but with inadequate equipment. Later, however, a large and small magnet were installed here under the direction of the senior consultant. A ward was set aside for ophthalmic cases and a clinic room was provided. Later, Capt. (now Major) Ralph A. Fenton was sent here to take charge of the eye work in this important post and under his unusually skillful guidance one of the finest advanced ophthalmic centers was developed and a great deal of skillful work performed. So excellent was the work of Major Fenton that he was the choice of the ophthalmic consultants to act as our consultant for the Third Army. He was followed at Evacuation Hospital 1 by Major G. I. Hogue.

10. At this time a number of camp hospitals were visited, but it was thought advisable for most of these to send their ophthalmic cases to the nearest base hospitals, rather than to have an ophthalmic surgeon assigned.

11. *Base Hospital 17, Dijon.*—A visit to this hospital found Lieut. (now Major) D. A. Campbell in charge of the eye as well as the ear work, which he carried on continuously in an excellent manner. One of the auxiliary optical units was assigned to this hospital. Patients from surrounding camp hospitals were sent here, and at one time a good many British wounded, as well as American, were treated.

12. *Evacuation Hospital 2, Baccarat.*—Lieut. Cyril Barnert was in charge of the eye work but doing no refraction, simply taking care of the ordinary eye service of a forward hospital. At one period Lieutenant Barnert had a very active experience treating the very severely gassed patients who arrived at this hospital. This hospital was only a few miles

back of the line and received the gas cases early. Lieutenant Barnert had a large bathing establishment for the gas cases, which was excellently equipped, so that as soon as patients arrived they were bathed and had their eyes and nasopharynx carefully treated, thus avoiding many of the more severe complications usually occurring. Later, two magnets were installed here, but realizing that this hospital could send cases needing the use of such instruments to Vittel, these magnets were removed to one of the forward evacuation hospitals just prior to the advance into the Argonne. Later, Captain Rau was placed in charge on the return of Lieutenant Barnert to his unit. A more efficient equipment was procured, including a trial case, and special rooms set aside for the eye clinic.

13. *Camp Hospital 27, Tours.*—This was one of the earliest hospitals, with Capt. Louis L. Henninger doing the eye work. One of the auxiliary optical units was established here. Later Capt. E. H. Cooper was assigned when Captain Henninger was sent to rejoin his unit. The optical unit rendered excellent service and a good deal of refraction work from this area passed through this camp hospital.

14. *Base Hospital 8, Savenay.*—An early visit was made to this hospital, which had always been a most important one in a most active and progressive center. Lieut. E. D. Loughran was in charge of the eye work, assisted by Lieut. R. E. Riemers. (Shortly after Lieut. Riemers was sent from this hospital to Evacuation Hospital 7, in which he served thruout all the trying times at Coloumiers and Souilly. Lieutenant Riemers had been indefatigable, patient and unassuming, performing general ward service as well as taking care of special work. No ophthalmic surgeon in the A. E. F. deserves greater praise than Lieutenant Riemers.) Later, at Base Hospital 8, Capt. Ray Connor was put in charge of the ophthalmic service and made consultant for the Savenay area. An entire ward was turned over to the ophthalmic service and a large room finally secured for the ophthalmic clinic. One end of the ward was partitioned off, making an excellent room for the preliminary instruction given here to the blind. This hospital has been very well furnished with ophthalmologic equipment other than magnets, the current here being such that magnets could not be installed. One of the first auxiliary optical units was assigned to this hospital.

15. Base Hospitals 27-34-101.—Visits to these hospitals found eye clinics established in all, with special wards for the ophthalmic cases. Base Hospital 101 was equipped with a magnet. Especially good work was done at Base Hospital 34 by Lieut. R. J. Sprowl and at No. 27 by Capt. (now Major) S. S. Smith, both of whom have carried on during the entire war in a most efficient manner. Lieut. Sprowl is one of our youngest ophthalmic surgeons and he has had one of the largest and best ophthalmic clinics in France. Later in the season one of the magnets made at the medical department repair shop was sent to Base Hospital 27.

16. *Base Hospital 6, Bordeaux.*—This hospital has, since its arrival in France, had an excellent clinic, with a most efficient officer in the person of Capt. Ralph Hatch. An optical unit was assigned here. Base Hospital 3 had no ophthalmic surgeon at the time of the first visit of the senior consultant and all the eye cases were being sent to Base Hospital 6. An eye clinic was later established at Base Hospital 3 under Lieut. Cyril Barnert.

17. *Base Hospital 24, Limoges.*—This hospital had a good eye clinic, presided over by Capt. Bahn, who was later made consultant for the Limoges area. This had been one of the most active eye clinics, and Captain Bahn had carried on with a very good equipment in a very excellent manner thruout the period of the war. An optical unit here would make the service more efficient and one was to be assigned on the arrival of the new units cabled for. Capt. Bahn's suggestions for standardizing of eye work and equipment were most excellent.

18. *Base Hospital 1, Vichy.*—This hospital had a small eye clinic in charge of Capt. W. W. Weeks, assisted by Lieut. H. L. Pelle, but this became unnecessary after the arrival of Special Base Hospital 115, tho it still continued caring for

some ophthalmic cases. Captain Weeks, during the active period of the war, did excellent work at some of the evacuation hospitals, both attached as ophthalmologist and on surgical teams. An auxiliary optical unit was first assigned to No. 1, but on arrival of No. 115 was transferred.

19. *Base Hospital 20, Chatel Guyon, and Base Hospital 30, Royat.*—Both of these hospitals had small eye clinics in the care of competent men and with fair equipment, especially Base Hospital 20, which brought over its own equipment, including two magnets.

20. Following these visits, base and evacuation hospitals arrived very rapidly and were visited as shortly after their arrival as possible by one of the consultants, either the senior consultant, Lieut.-Col. Allen Greenwood, the assistant consultant, Lieut.-Col. George S. Derby, or Lieut.-Col. Nelson M. Black, who was, late in the summer, attached to our general consulting staff. Advice and assistance were given to the various ophthalmic surgeons in these newer hospitals as to building up their clinics, or combination centers, and plans furnished. In October, a visit was made by the senior consultant to all the hospitals in Base Section 3 (England) and a list of suggestions sent to the Chief Surgeon, A. E. F., and a copy to the chief surgeon of Base Section 3 as to the need of officers, optical units and supplies. While in London the senior consultant improved the opportunity to purchase tools and supplies to outfit several of the auxiliary optical units being organized at the base unit in Paris.

II. CONSULTANTS

The senior consultant in ophthalmology for the A. E. F., Lieut.-Col. Allen Greenwood, was assigned to Consultant Headquarters at Neufchateau in May and the office of the division of ophthalmology was established there. As the service developed an assistant consultant in ophthalmology, Lieut.-Col. George S. Derby, was appointed for the A. E. F. and in September a third medical officer, Lieut.-Col. Nelson M. Black, with an appointment as consultant in ophthalmology was added to the force.

In the beginning, with only two evacuation hospitals (Nos. 1 and 2) in the field, it was possible to cover their work from the office at Neufchateau and also to give consulting service to the second line hospitals at Chaumont, Bazoilles and Vittel-Contrexeville, as well as to make a certain number of consulting tours through the rest of the A. E. F.

Moreover, at this time, but few medical officers were available, who could be put in charge of areas. As more base hospitals, and also the casual ophthalmologists cabled for, came to France, it was found necessary and possible to establish consulting areas which could run independantly or with only occasional assistance from the Neufchateau office.

With the establishment of many evacuation and mobile hospitals at the front, the senior consultant felt very keenly the necessity of supplying to those soldiers with wounds of the ocular structures the best available advice at the earliest possible moment. Therefore, a considerable amount of the time of the consultants was taken up with frequent visits to these front line hospitals and to the advanced base hospitals; and a good deal of routine and consulting operative work was performed by the consultants from this office in the evacuation and mobile hospitals during the offensives.

When the first extensive fighting of the American forces began, for the capture of the Chateau Thierry salient, the first influx of wounded men came into the evacuation hospital at Ecury sur Coole. There being no ophthalmologist in this area, the senior consultant and the assistant immediately proceeded to Evacuation Hospital 4 where they took care of the ophthalmic cases for this hospital, Mobile Hospital 2, nearby, and the field hospital at Chalons. Besides this, considerable time was spent in general *triage* and surgical work. As the scene of activity shifted more to the Chateau Thierry front the senior consultant proceeded to the evacuation hospitals in this area, while Lieut.-Col. Derby remained at No. 4, with orders to proceed to Paris as soon as relieved. The next ten days were spent by the senior consultant going as needed from Evacuation Hospital 7,

at Moulanglaust, to No. 8, at Juilly, thence to Red Cross Hospital 14, at Jouy sur Morin and to Evacuation Hospital 5, at Crepy. At Evacuation Hospital 7 the nights of July 28 and 29 were spent in doing *triage* work, the first night in a reception tent and the second night in an open field by the light of four lanterns. This experience was the basis of a number of suggestions made later to the Chief Surgeon with regard to the reception and *triage* of wounded men during an active offensive.

At the same time a systematic attempt was made to keep in close touch with the base hospitals of the intermediate and base sections. The Bordeaux and Clermont-Ferrand sections were visited twice from the consultant's office. The larger areas of Bordeaux and Limoges had local consultants, while later there was an eye consultant to cover the whole of Base Section 2. All other base hospitals in the A. E. F., with the exception of the more recently established, were more frequently covered and some with great frequency, such as Savenay, Vichy, and especially Paris, during the period of the Chateau Thierry activity. There were at the time of the armistice local consultants at Toul, Bazoilles, Vittel-Contrexeville, Allerey, Paris, Mars, Mesves, Vichy, Limoges, Nantes, Savenay and, as stated before, a consultant for Base Section 2, and also a consultant for Base Section 3.

In addition to the visiting of hospitals by consultants, circulars for the guidance of ophthalmologists were sent out from time to time by the senior consultant. This was more necessary owing to the fact that none of the manuals published in the Surgeon General's office ever reached France until after the armistice was signed. These circulars were also largely written answers to the numerous requests from opthalmologists for help and suggestions. A few officers brought with them Manual 3, which, according to their statements, was of great help in carrying out the various necessary surgical procedures. In any future expeditionary forces, hospitals of every kind on leaving this country should be supplied with an up-to-date medical library.

HEADQUARTERS MEDICAL AND SURGICAL CONSULTANTS,
AMERICAN E. F. APO 731, FRANCE.
DIVISION OF OPHTHALMOLOGY,
6, SEPTEMBER, 1918.

CIRCULAR 1

I. *Gassed Eyes.*—Treatment of eyes injured by those gases which produce a chemical conjunctivitis (mustard base-dichlor ethyl-sulphid):

The earliest possible treatment is necessary to lessen the duration of the disability. The early treatment should be given at the first bathing. It should consist of a thoro flushing of the conjunctival sacs with a 1 per cent solution of the sodium bicarbonat, preferably warmed to body temperature. Care should be exercised to see that both the upper and lower cul-de-sac be thoroly cleansed.

Following this treatment the eyes should be washed out every four hours in severe cases, with either a solution of sodium bicarbonat, 15 per cent normal saline solution or a saturated solution of boric acid, and a drop of liquid petrolatum should be instilled after each washing. Olive oil may be used when liquid petrolatum is not available. Castor oil has been found somewhat irritating.

In the more severe cases corneal involvement of greater or less degree is common. This takes the form of a roughening and opacification of the corneal epithelium, leading to ulceration, and producing permanent damage of the eye and may even cause a complete loss of sight. Such cases always show marked photophobia and usually a contracted pupil, and require for treatment that a solution of atropin sulphat, 1 per cent, should be used sufficiently often to keep the pupil dilated and the eyes should be shaded from the light but never bandaged. As soon as the corneal or uveal disturbance has subsided the atropin should be discontinued; and it is advisable to get the patient up and accustom him to the light, to avoid long hospitalization of such cases. Secondary infection of the conjunctiva is common and may be treated by a solution of argyrol, 20 per cent, instilled three or four times a day. Self-induced relapses

are not uncommon and should be watched for.

In the later stages when photophobia persists without signs of conjunctival irritation to account for it, it is advisable to use cold douching of the eyes two or three times a day and to employ the patient in some suitable light occupation.

Where corneal involvement is marked, the ophthalmic consultant should be asked to see the case.

II. *Injuries.*—Contusions of the eye without rupture. Guarded prognosis, watch tension, especially if traumatic cataract develops. Look for and record any choroidal injury.

Contusions of the eye with rupture. If extensive, with great loss of globe contents, enucleate. If less extensive, with little loss of contents, suture and cover with conjunctival flaps after freeing wound of any prolapsed tissue.

For penetrating wounds, with foreign body inclusion probable, the magnet test should be applied. If this shows foreign body to be magnetic, remove by magnet, preferably by anterior route if small, and if large thru the wound of entrance, if unable to remove small foreign body with the magnet at hand, route cases if possible to the base eye center, location of same to be designated later. Where foreign body is nonmagnetic and not easily removable, follow expectant treatment, as such foreign bodies are often encysted.

It should be especially emphasized that penetration of the eye by a foreign body, without a discoverable wound of entrance, is not an uncommon occurrence. All suspicious eyes should, therefore, be thoroly investigated for a foreign body, by means of the magnet, the ophthalmoscope and by the X-ray when necessary.

Penetrating wounds without foreign body inclusion should be immediately covered with a conjunctival flap after freely removing prolapsed tissue, then treated as any eye wound. Where an eye is too badly injured to save or where sympathetic ophthalmia is to be feared and no vision is likely to result from conservative treatment, the eye should be enucleated. At time of enucleation some material, preferably one of the large glass spheres, should, if possible, be implanted in Tenon's capsule. If this cannot be done, it is at least imperative that the four recti muscles should be sutured together.

In penetrating injuries of the eye, showing proptosis to a greater or less degree, a thru and thru perforation of the globe should be suspected.

Panophthalmitis.—When a penetrating injury results in panophthalmitis it is best to eviscerate and this operation should be the one chosen for a hopelessly injured eye complicated by orbital cellulitis.

After enucleation or evisceration an artificial eye should be fitted as soon as the socket permits.

An only eye, or both eyes should never be removed without the advice of the consulting ophthalmic surgeon. The senior consultant in ophthalmology should be notified of any soldier blinded, or likely to be blinded, as a result of injury or disease.

Orbital Injuries.—A small foreign body in the orbit not easily accessible should be left unless cellulitis develops. Larger bodies should be removed avoiding injury to muscles and nerves.

Orbital cellulitis requires free drainage.

Perforating wounds of the orbits by bullets or other missiles should be treated symptomatically. Lagophthalmos from the extreme exophthalmos often seen in such cases or the lagophthalmos resulting from facial palsies should have the lids sutured together to protect the eye if there are any signs that the cornea is likely to become involved.

Brain Injuries.—All brain injuries or severe cranial wounds likely to show brain involvement should be frequently examined by the ophthalmic surgeons and all opportunities should be improved for studying the fundi and fields of vision of such cases.

III. *Trachoma.*—The possibilities of the introduction and spread of trachoma among the men of the A. E. F. require that every effort be made toward its prevention. Cases of trachoma are bound to be discovered among our troops. Cases showing trachoma in the contagious stages or suspected of being in this stage

should be immediately sent to a special base eye center for treatment and cure. Such cases should be segregated at the special center until cured.

Section 3 does not refer to foreign labor in the employ of the A. E. F. Special arrangements will be made for handling trachoma occurring in these units.

IV. *Refraction.*—Each hospital in which refraction is done should requisition a sample set of army spectacle frames from Base Optical Unit, A. P. O. 702. These frames are number 1-2-3. In ordering frames specify the number of frame which fits best, give the interpupillary distance and, in special cases, designate the amount of offset or inset (this may be read off from the trial frame).

An eye record slip will shortly be issued and is to be filled out for every case refracted. Under sph., cyl., ax. record glasses ordered, or, if no glasses ordered, record error of refraction found. Note whether cycloplegic used and whether glasses were ordered. Other notations explain themselves. This slip should be pasted inside the cover of the pay book to be issued to troops after October 1 or, if that is unavailable, inside the spectacle case.

It is desirable that a cycloplegic be used as a routine except in those cases where it is unnecessary or contraindicated.

On account of the great scarcity of atropin and homatropin, these drugs must be conserved in every possible way. It is suggested that for mydriasis cocain be used as far as possible, and for cycloplegia an oily solution of homatropin 1 per cent and cocain 2 per cent be employed. Instill one drop in each eye and wait 45 to 60 minutes before refracting. By this method a fairly satisfactory cycloplegia can be obtained.

Glasses are to be ordered only when a refractive error exists which materially interferes with the efficiency of the soldier.

Prescriptions for toric lenses for soldiers and noncommissioned officers will not be filled.

V. *Reclassification.*—Troops will be reclassified as to vision, according to the G. O. 10 Hq. S.O.S., April 12, 1919. For your information a copy of this order is appended. In interpreting this order, a certain amount of latitude is allowed the ophthalmic surgeon to the end that men with useful vision, but not strictly within the above standard should not be lost to the service.

Copy of G. O. 10, G. H. Q., S. O. S.

France, April 12, 1918.

Headquarters, S. O. S.
G. O. 10.

ABSTRACT.

The following standards will govern in cases of eye defects:

Class A.—To include men with uncorrected vision 20/40 for the better eye and 20/100 for the poorer one, provided no organic disease exists in either eye.

Class B.—To include cases of toxic amblyopia, active choroiditis, interstitial keratitis, ocular paralysis with diplopia, anterior or posterior synechia, if awaiting operation, and trachoma.

Class C.—To include men with uncorrected vision of less than 20/40 and 20/100 and men with a correct vision of 20/70 in one eye and the other being amblyopic or blind.

Class D.—To include men with corrected vision of 15/200 or less in each eye, men blind in one eye, with corrected vision in the other of 20/70 or less: men with glaucoma, retinitis pigmentosa, optic nerve atrophy, high myopia with extensive fundus changes and disseminated choroiditis.

A recommended change of standards for reclassification is shown on page 37.

VI. *Records.*—For the purpose of later investigation, it is requested that you keep in your department a record of the name, number, organization and home address of those patients in whom the diagnosis of an intraocular foreign body has been made. This is not meant to include cases in which the eye has been removed.

It is also requested that you keep a careful record of all gas cases developing a *definite corneal ulceration,* as well as of other cases of special interest.

VII. *Pathologic Material.*—Enucleated eyes or other pathologic material which requires examination by a specially trained pathologist should be placed in

ten per cent (10%) [formaldehyd] formalin solution and held, pending directions for forwarding. These specimens should be labeled with the name and number of the cases and essential notes of the clinical condition.

VIII. *Pterygia.*—Pterygia should not be operated on in France unless seriously interfering with the efficiency of the individual.

IX. *Strabismus.* — Strabismus cases should be operated only under exceptional circumstances.

ALLEN GREENWOOD,
Major, M. C.,

CIRCULAR 2.

9th October, 1918.

I. *Glasses for the American Expeditionary Forces.*—Ophthalmic Surgeons in the A. E. F. are requested to exercise great care in prescribing weak lenses. Many prescriptions have been sent to the optical units for simple 0.25 cylinders.

Men who are not doing confining clerical work rarely, if ever, need a glass of this strength. It is also very seldom that 0.50 cylinders are needed unless the axes are oblique or against the rule. Because a soldier is sent down for an examination of his eyes and a weak error of refraction is found, it must not be considered necessary on this account that glasses be ordered when some good advice regarding the care of the eyes will probably accomplish the desired result. No hard and fast rules can be laid down and ophthalmic surgeons must use their judgment but keep in view the matter of not overburdening the optical units.

II. *Signing Prescriptions.* — Ophthalmic Surgeons must sign all prescriptions for glasses. All orders for supplies sent to the base hospital unit must be in duplicate and sent thru the commanding officer.

III. *Adjusting Optician.*—It is suggested that the ophthalmic surgeons make inquiry, thru proper authorities in the hospital where they are on service, to see if, among the hospital enlisted personnel, a good adjusting optician may be found who might be available for service in the eye clinic.

IV. *Wounds of the Eyelids and Adjacent Parts.*—Extensive debridement of wounds of the eyelid and adjacent structures is seldom necessary, it being of greatest importance for the proper function of the eye that every effort be made to save tissue in wounds involving the lids and adjacent structures. Primary repair of almost all of these wounds should be attempted and this will obviate the necessity of much secondary plastic work. In very extensive wounds it may be necessary to insert a small drain in one corner. Special attention is called to the necessity of early and accurate repair of wounds of the lower lids with special reference to those involving the inner portion.

V. *Orbital Wounds.*—Orbital tissues should be conserved in doing enucleations and eviscerations. An orbit should never be packed but where an orbital cellulitis exists a small drain is often advisable. An evisceration leaves a very good stump and this operation should be the one selected for a ruptured and collapsed eyeball and for a panophthalmitis. It should be the operation of choice where a good clean enucleation, with implantation of glass ball, is not practicable. Glass balls may be obtained on requisition from the Inter. Med. Supply Depot No. 3.

CIRCULAR 3.

22, November, 1918.

I. *Artificial Eyes.*—Four centers have been established where men requiring artificial eyes can best have them fitted, Base Hospital No. 6, at Bordeaux, Base Optical Unit, Medical Department Repair Shop, Paris, Base Hospital No. 8, at Savenay and Base Hospital No. 65, near Brest.

Cases requiring plastics on the eyelids or orbit, prior to the fitting of an artificial eye, should be routed to Base Hospital No. 115, if practicable. Such cases appearing in Paris may be sent to A. R. C. M. H. No. 1 or No. 2.

II. *Trachoma.*—Cases of trachoma which occur among the troops can be treated in the Base Hospitals, but precautions should be taken to prevent any

danger of spread of the disease. Special care of towels and handkerchiefs is most necessary. Severe cases likely to require long treatment, with resultant impairment of vision, should be classified "D" and routed accordingly.

III. *Technic of Glass Sphere Implantation in Tenon's Capsule.*—(Frost's operation.) These suggestions are intended for surgeons who have not been accustomed frequently to perform this operation:

(*a*) The eye should be enucleated in the ordinary manner except that the four recti muscles should be isolated and secured separately, either with a small artery clamp or with a stitch and should be laid back out of the field of operation. The cavity should then be packed until dry.

(*b*) The edges of Tenon's capsule should now be seized at four points with artery clamps, and a glass ball, 18 to 22 mm. in size, should be inserted.

(*c*) Silk of sufficient strength is used thruout for suture material. Tenon's capsule is closed with three or four sutures placed in the horizontal line. The muscles are next sutured, superior rectus to inferior, external to internal. The conjunctiva is now closed with three or four sutures in the horizontal line.

(*d*) Extrusion of the glass ball will not occur, except under extraordinary conditions, unless a definite infection of the socket exists. A certain amount of reaction is practically always to be expected following the operation. The conjunctival sutures should be removed when the reaction subsides.

IV. *Plastic Work on the Eyelids.*—In many cases requiring plastic work on the eyelids the condition is complicated by defects of the orbital margins and of the fleshy and bony structures of the face. Much progress has been made during this war in facio-maxillary surgery. Our mutilated soldiers are entitled to the best professional advice obtainable and in few cases of this nature is a delay of one or two weeks of any importance to the patient.

Our larger hospital centers, such as Base Hospital No. 115, at Vichy, are especially equipped for this reconstructive work. These cases need special study and often tax the ingenuity and skill of the best trained men. If you are not well equipped to handle this work and if you have not the opportunity to obtain the cooperation of an experienced facio-maxillary surgeon, do not operate, but send the case on to a center where this combination is available.

V. *Refraction.*—Read Circular No. 1 in regard to eye record slips. These slips should now be available in every clinic. They should be filled out in all instances in the clinic where refraction is done. All spaces should be filled in and a note made as to whether a cycloplegic has been used. The slip should then be pasted inside the cover of the pay book, which has been issued to each enlisted man. If the enlisted man does not have his pay book with him he should be required to bring it.

VI. *Perimeters.*—Hand perimeters can be obtained from Inter. Med. Sup. Depot, No 3, American E. F., APO 737, France.

ALLEN GREENWOOD,
Lt.-Col., M. C., U. S. A.,
Senior Consultant in Ophthalmology.

From the personal experience of the senior consultant in ophthalmology and those assisting him, who have visited various ophthalmic clinics, particularly those of isolated base hospitals, the value of such visits has been enormously apparent. The thought that someone is interested in their work is very stimulating to the young ophthalmologists in such clinics. They are eager to receive the advice given in regard to various operations and procedures and become much more interested in their work. They are stimulated to study cases more carefully so that they can present them in a satisfactory manner in case of future visits from the consultant.

During the summer and fall the senior consultant urged the men he visited to do as much research work as possible, to write interesting descriptions of their cases and to make illustrations. Different men were assigned different forms of ophthalmic injuries or diseases for their particular study. They were instructed in better methods of keeping

records and in the more up-to-date methods of treating traumatic conditions. The men in centers were encouraged to organize frequent meetings for mutual help and study; and the spirit of cooperation between the senior consultant and the ophthalmologists thruout France left nothing to be desired and was most gratifying and stimulating.

III. OPTICAL DEPARTMENT.

1. *Optical Units.*—The base optical unit, with eight auxiliary units, was authorized by cable to the War Department A.G.O., Feb. 25, 1918, and was organized in the Surgeon General's office by the author. The units were mobilized at Camp Crane, Allentown, Pa., in March, 1918, and left the United States April 26, 1918, arriving in France May 4, 1918. These units had an authorized strength of one officer and thirty-six men and left the United States with one officer and twenty-nine men. The present strength of the unit is one officer and seventy-nine men, Capt. (now Major) F. H. Edmonds, S. C., in command.

The equipment, stock and machinery was released for the base unit from New York City, March 15, 1918, and thus the heavy machinery, amounting to nearly nineteen tons, was shipped from the United States before the men left, but on the arrival of the unit in France, the machinery had not been located. Part of it, however, reached Paris on July 4, 1918. The result of this delay was that the personnel of the base unit was partially idle for nearly two months; and this heart breaking delay in getting to work prevented the sending of replacement lenses to the eight auxiliary units which were sent out shortly after their arrival in France. This lack of replacement lenses was never fully made up.

While awaiting the machinery, facilities were afforded for a number of the members of the base unit to work in the shop of E. B. Meyrowitz grinding lenses for the A. E. F. This opportunity was due to the kindness of Mr. Lambrecht, who helped in every way he could during the time before the machinery arrived. Dr. Louis Borsch, of Paris, was also of much help in aiding Major Edmonds to obtain many of the much needed minor supplies.

The remainder of the machinery arrived in Paris Sept. 29, 1918. The building for the shop was completed July 24, 1918, and was located first at Neuilly, with the instrument repair shop, but was later moved to Porto St. Cloud to be with the medical department repair shop.

The shop was partially in operation July 27, 1918, but not in full operation until October 1, 1918.

The machinery and equipment supplied was based on an approximate production of 100 pairs of glasses per day.

From July 27, 1918, to December 1, 1918, the production was as follows: 21,828 prescription jobs, 3,091 smoked spectacles, 1,620 repair jobs. The unusual nature of the prescriptions received caused many complications, necessitating the manufacture of special tools and gauges. Prescriptions for spherical lenses as high as 12.00 D and cylindrical lenses as high as 10.00 D were received and filled. *Fifty per cent of the prescriptions received averaged spherical from 2.00 to 5.00 D., in combination with cylinders from 1.50 to 5.00 D.*

The equipment of the shop is given below:

7 Hand surface grinding machines.
4 Automatic cylinder grinding machines.
6 Automatic edge grinding machines.
3 Hand edge grinding machines.
1 Diamond drill.
1 Diamond cutter.
3 pairs spherical grinding tools.
29 pairs toric cylinder grinding tools.
Complete small tool outfit, such as buffs, centering machines, neutralizing instruments, files, pliers, etc.

The surface grinding machinery was not designed for the unexpected amount and unusual character of work received. Rough cylinder blanks or optical machinery were not available in France. To produce these lenses from rough glass stock with the limited number of cylinder machines designed for special work was slow and unsatisfactory even with a full day and night force in operation.

A special attachment was devised to supply the demand for prescription lenses

in gas masks. This attachment fastened over the eye cups of the masks and contained a 47 mm. lens so decentered as to give the proper pupillary distance.

Nearly a thousand prescriptions for glasses came into the shop prior to the setting up of the machinery and there has been a steadily increasing flow of prescriptions ever since, taxing the personnel to the utmost. At the time the author left France the base optical unit had sufficient machinery and men to care for the prescription and repair work of the entire A. E. F., but, owing to the slowness with which the supplies had come to hand, it had never been possible to take full advantage of the facilities, and at that time it was particularly embarrassing, owing to the failure of the newly arrived auxiliary units to bring their supplies with them as directed by cable. Counting on this supply, the stock at the base unit was heavily drawn on to provide the supplies for the newly organized units sent to Mesves Center, Base Hospitals 29 and 33 and the two units sent to the Army of Occupation.

All this has entailed a great deal more surface grinding than was originally intended, and to meet this the shop has been run at times at night, as well as day, on an eight hour shift.

The shop as it was finally in full operation was a model of its kind and was praised by the manager of the English spectacle depot and by the consultants of the British ophthalmological service.

2. *Auxiliary Units.*—As soon as the hospital situation could be sufficiently studied by the senior consultant the auxiliary units were assigned as follows:

1. One unit to Base Hospital 15, where a room near the headquarters building and opposite the eye ward was turned into an optical shop.
2. One unit to Base Hospital 18, where a special room was assigned.
3. One unit to Base Hospital 25, tho later this unit was transferred to Base Hospital 36, where an eye center was established.
4. One unit to Base Hospital 1, later transferred to Special Base Hospital 115, on its arrival.
5. One unit to Base Hospital 6.
6. One unit to Base Hospital 8, where an eye center was established.
7. One unit to Base Hospital 17.
8. One unit to Camp Hospital 27.

These units immediately began to do excellent work and were much appreciated. While organizing these auxiliary units in the United States the senior consultant fortunately arranged that they carry with them, as personal baggage, all of their supplies. Therefore, they had a good supply of cut and edged lenses, and frames, with all necessary adjusting tools, so that all ordinary prescriptions could be filled at once, thus saving the day for these optical units. Later they were handicapped by the lack of replacement lenses mentioned before as being due to the late arrival of machinery and supplies for the base or replacement unit. By circularizing the ophthalmic surgeons of the A. E. F., an attempt was made to lighten the increasing burden on the optical units by discouraging the ordering of weak plus and minus spheres and cylinders unless very positive indications were present pointing to their need. (Circular 2.)

With the increase in numbers of the troops and hospitals in the A. E. F., it became apparent that additional units would be needed. In fact, many hospitals and hospital centers made strong appeals for optical units. There were three ways of supplying this insistent demand, a demand which shows how much the optical units were needed: (1) by cabling for new units to be sent over fully equipped. This was done by the Chief Surgeon and six new auxiliary units asked for; (2) by using opticians found among the personnel of the base hospitals and supplying them with equipment; (3) by using opticians already connected with the optical shop or auxiliary units and supplying them with equipment.

Pending the arrival of the units that were cabled for, units were organized by the second and third methods and placed as follows:

1. One at the attending surgeon's office at Paris, made up at the base optical unit.
2. One at the Mars Center, making

use of the men already there and equipping them.

3. One at Base Hospital 29, made up at the base optical unit.

4. One at Base Hospital 33, made up at the base optical unit.

5. Two for the Army of Occupation, made up at the base optical unit.

6. One for the Mesves Center, made up at the base optical unit.

Units were requested for the following places and they were to be supplied as soon as the equipment for the six new units arrived:

1. Base Hospital 65, Brest (most urgent).
2. Base Hospital 38, Nantes Center.
3. Base Hospital 27, Angers.
4. Base Hospital 45, Toul Center.
5. Base Hospital 24, Limoges.

In spite of all the discouraging delays, it was felt that the base optical unit and the auxiliary units creditably filled a place in the medical department of the A. E. F. They were a new feature for the medical department and more or less experimental, but the organizer considers that the worth of such an organization for expeditionary forces has been proved.

3. *Mobile Optical Units.*—Authority was requested to equip two mobile units, and this office was asked to submit plans, but the cessation of hostilities and the expected arrival of new auxiliary units, with double equipment, made the project seem unnecessary. For serving the shifting mobile and evacuation hospitals in an advanced area, this plan would have been most helpful and merits consideration for the future. It was expected to make these mobile optical units more independent than were the auxiliary units by the addition of an edging stone and a supply of higher number lenses. They would thus have been small mobile shops, requiring a driver for the motor car, a skilled optical mechanic and an adjuster, and taking their power from the motor of the truck. With two such mobile shops for the advancing troops, with the big base shop as outlined in the foregoing, with a sufficient number of auxiliary units, and, above all, with means of rapidly transporting finished orders to all points, an optical division could give the maximum of service to an expeditionary force.

4. *Suggestions for the Future.*—As a result of actual experiences, mistakes and delays, the following suggestions are offered for future organizations:

(*A*) *Base Unit.*

1. The base unit should start out with larger supplies of blanks and surface ground lenses, and adequate arrangements should be made for a monthly automatic supply.

2. More experienced men who have had an extensive shop (surface and edge grinding) experience would be advisable.

3. An independent power plant in case of a breakdown in the electric current ordinarily supplied.

4. Besides the commanding officer, two commissioned officers should be attached to future base optical units. (At the time the author left France, Major Frank H. Edmonds was in charge of seventy-nine men, with no commissioned officers between him and the first class sergeants. An effort to rectify this state of affairs, which was palpably inefficient, was made, but the cable in regard to new commissions prevented this.)

5. An additional set of surface and edge grinding machines would be advantageous in case of any breakdown of the ones usually in use.

6. Adequate means of quickly transporting finished supplies to all the areas fed from the base optical unit. Too much stress cannot be laid on this suggestion. In numerous instances a delay of from three to six weeks occurred between the time of shipment from the base unit and the arrival of the goods at the hospital or auxiliary units, which frequently meant that glasses arrived long after the men to receive them had been discharged and, therefore, hard to follow up, or men were hospitalized much longer than should have been necessary. Many times goods never reached their destination, requiring a duplication of the order. A number of the more distant hospitals sent their own messengers to bring the finished orders back from the base unit. With the increasing evidence of these delays, arrangement was made with Lieut.-Col. Jones of the medical department repair shop to send some of the

larger shipments by a courier from the base optical shop, and it was imperative that this direct courier service be greatly extended until it covered the entire territory. The following letter was sent to the Chief Surgeon as appertaining to this suggestion:

American E. F., APO 731, France,
9th December, 1918.

From:
Senior Consultant in Ophthalmology.

To:
Chief Surgeon (Attention Colonel Shepard), thru Director of Professional Services, A. E. F.

Subject:
Improvement in forwarding optical supplies from the Base Optical Unit.

1. On November 26th, a circular was sent to the Commanding Officers of the Base and Evacuation Hospitals in order to get data for making up the final report of the Ophthalmic Service to the Chief Surgeon. Many answers have been received to this circular and a great many of them call attention to the fact that glasses sent out from the Base Optical Unit are delayed several weeks in the Parcel Post. It was realized that this method of sending glasses from the Base Optical Unit was slow but it was not known that the delay was generally so great. Recently when large shipments have gone out from the Base Optical Unit a courier messenger has carried them from the shop to their destination. It would vastly improve this service if some arrangements could be made with Lt.-Col. Jones, the Commanding Officer of the Medical Department Repair Shop, for the assignment of several messengers from the Base Optical Unit to aid in the delivery of finished goods.

2. The Base Hospital Unit is so well supplied with men at the present time that two or three men could readily be assigned to this duty and it is felt that the financial outlay involved will more than be met by the saving from the present loss by using the package mail service. One courier per week for the four principal directions, namely, Chaumont and Bazoilles—Mesves, Mars and Vichy—Bordeaux and intermediate points—Savenay and intermediate points—would probably make the handling of this problem more efficient.

ALLEN GREENWOOD,
Lt. Col., M. C., U. S. A.

7. Two small completely equipped base shops, one in the advance section and one in the base section, would be advantageous.

(*B*) *Auxiliary Units.*

1. A double equipment of cut and edged lenses with a supply of these lenses running into much higher numbers, such as cylinders up to 4.50, running from 2.50 to 4.50 by half diopters.

2. Each auxiliary unit should be supplied with a hand edging stone.

The two foregoing suggestions would make future auxiliary units much more independent of the base optical unit and remove a little of the excessive burden from the parent unit.

5. *Artificial Eyes.*—Fortunately, at the last minute, before leaving New York, 1,000 artificial eyes were added to the equipment of the base optical unit. During the summer 200 artificial eyes were selected by the senior consultant from the supply in the hands of a manufacturer in Nantes, and still later, 500 artificial eyes were sent over as part of the equipment of Base Hospital 115.

A selection of artificial eyes was also expected as part of the equipment of the new optical units on their arrival.

At first, small supplies of artificial eyes were sent to various base hospitals; but this plan was evidently a mistake, as it was often impossible to find in the small collection sent an artificial eye suitable for the individual case. It was, therefore, decided to establish centers for the fitting of artificial eyes. Accordingly a large supply was left at Base Hospital 115, at Vichy and also at the base optical unit at Paris, and a supply sent to the port of embarkation for D cases at Savenay. After the decision to embark D cases from Bordeaux and Brest, a supply of artificial eyes was sent to Base Hospital 6 at Bordeaux and to Base Hospital 54 at Brest. A small supply was sent to Base Hospital 29, at Tottenham, England, as a number of men requiring artificial eyes were found in the various hos-

pitals in Base Section 3 at the time of the visit of the senior consultant.

It was thus hoped that no soldier who could be fitted with an artificial eye would be sent home without one.

Arrangements were made for those soldiers requiring minor plastics, before the fitting of artificial eyes, to have this work done at Vichy, Paris, Savenay and to a smaller extent in all the base hospitals. Men requiring more extensive plastics to enable them to wear an artificial eye were routed to Vichy, or classified D and sent to the United States.

IV. CARE OF THE BLIND.

Some of our soldiers have made the sacrifice which comes next to the supreme one of loss of life, when they have received injuries depriving them of all useful vision. Fortunately, the number of our battle blind has been much less than might reasonably have been expected.

It was felt that everything possible should be done to give these men courage, without undue and misplaced sympathy; and at first it was thought possible that they might be routed to the port of embarkation and sent *at once* to the hospital at Roland Park, Baltimore, conducted by Lieutenant-Colonel Bordley, the director of the Red Cross Institute for Blinded Soldiers and Sailors. In view, however, of the experience of Great Britain in handling this problem, as far as it concerned blinded Canadians and Australians, it was apparent that the immediate shipping of blinded men was apt to have a disastrous mental effect, and it became necessary to provide means of giving these men some preliminary training in the A. E. F. to tide them over their first discouragement and to make them better able to care for themselves and appreciate the fact that, while deprived of the most useful sense, they still, by the use of others, could accomplish wonders and be made useful and happy citizens. Having gained this confidence in themselves, they could then be transported to the United States with greater certainty of arriving in good condition.

At first, for a short time, in carrying out this preliminary training, the services of Miss Winifred Holt, who had done wonderful work among the French blinded soldiers in her *Phare de France*, were made use of, and she and her assistants visited the first American blind in Paris and Savenay. Later, Miss Dorothy Richardson, one of Miss Holt's workers, carried on the work, under Miss Holt's supervision, with the first blind sent to Base Hospital 115 at Vichy. Here excellent preliminary training was given to a few blind until they were ready to go to the United States. On the giving up of this small center for the preliminary education of the blind, Miss Holt ceased her personal services but released her assistant, Miss Richardson, to enter the employ of the A. E. F. as a civilian employe for the preliminary instruction of the blind. Miss Dorothy Richardson's services were invaluable to the A. E. F. in the emergency and she was at once put in charge of the blind work at Savenay, where a much larger school was established and where at one time she, and her assistants, had thirty-five blind men to teach. (The funds for carrying on this work were furnished by Lieutenant-Colonel Bordley.) With the exception of a very small number, all of our American battle blind came under the care of this capable young woman.

At this time the Red Cross was requested by the Chief Surgeon, at the suggestion of the senior consultant in ophthalmology, to cable for Major Migel to come to the Red Cross headquarters in Paris, to assist in carrying on this work, under the supervision of the senior consultant in ophthalmology. In view of the fact that the blind were to be sent to a Red Cross institute in America, this arrangement seemed peculiarly fitting.

The Chief Surgeon, at the suggestion of the senior consultant in ophthalmology, also cabled for eight reconstruction aids, qualified to give preliminary instruction to the blind, to be placed, on their arrival, at the disposal of the senior consultant. It was intended to send two of these aids to Savenay, two to Vichy, one to Vittel, one to Red Cross Military Hospital 1, in Paris, one to Bordeaux and one to England. Tho the cable was sent in August, these aids did not arrive until late in December, but

there was still work for them and they were very welcome. They were brought by Major Migel as Red Cross aids and at once became of great help in carrying on the work.

When it became apparent, early in the last drive at St. Mihiel and the Argonne, that a number of blind were to come down to Savenay, it was decided to organize there a school for their preliminary instruction. As mentioned before, this was placed in charge of Miss Dorothy Richardson, who was ably assisted by Mr. Baker, a teacher of the blind, himself blind since 6 years of age, who was kindly released for this work by the A. B. F. B. Fund organization. This organization also furnished a sufficient supply of typewriters, Braille primers, games and other appliances for the preliminary instruction of the blind. Later there was added to the teaching force a Red Cross worker, Miss Rose Thorndike, a reconstruction aid, Miss Harvey, and two of the aids brought by Major Migel. Just before the school was established at Savenay the senior consultant visited Hospital 8, on receiving notice that several blinded soldiers had been admitted, and found a very sad group of men in the ophthalmic ward and a general air of depression thruout. Steps were at once taken to have Mr. Baker sent to Base Hospital 8. A few days later, on making a second visit to Savenay, a most striking change was observed. Mr. Baker had arrived and had voluntarily occupied a bed in the ward among the blind soldiers. The influence of his cheerful personality coupled with the knowledge that he had done such successful work as a blind man was very great. The men were singing, laughing and, a little later, were listening to stories that Mr. Baker was relating. The help of having such a man living with these blind soldiers and taking part in their activities, telling them about his personal experiences and encouraging them to help themselves was, thruout the time of his service in Savenay, of untold assistance.

During the summer Mr. W. W. Stamm, formerly secretary to the Pennsylvania Association for the Blind and a Y. M. C. A. worker in France, was commissioned a first lieutenant in the Sanitary Corps and made several trips with the blinded soldiers from the forward areas to Savenay. The largest group to be sent home departed about December 13 and consisted of twenty-seven blinded men, with Lieutenant Stamm in charge, who left with orders to proceed with them to the institution at Baltimore. All of these twenty-seven soldiers had received from three to eight weeks' training and all reached the United States in good shape.

The work at Savenay has had a very striking influence on the morale of the blind men collected there and it is felt that this work has been carried on in a very satisfactory manner.

From statistics at hand it can be stated that the number of American soldiers, totally blinded from battle injuries during the period from the time the troops first came to France up to the present, will be slightly less than one hundred.

V. RECLASSIFICATIONS.

Since it seemed that an improvement could be made in standards of visual classification adopted for the A. E. F., the matter was taken up by the division of ophthalmology and the following classification submitted to the Chief Surgeon and later adopted:

Class A.—To include men with uncorrected vision of not less than 20/40 for the better eye and not less than 20/100 for the poorer eye, providing no organic disease exists in either eye and with good field of vision.

Class B.—To include cases of active organic disease of the eye, or conditions the result of trauma, in which recovery with vision not less than that required for Class C, may be expected within a reasonable length of time.

Class C.—(1) To include men with vision correctable with glasses to not less than 20/100 in *each eye*, with a good field of vision and provided no active organic disease exists; (2) men with one eye amblyopic, blind or lost, provided the remaining eye has vision of not less than 20/100 correctable with glasses to 20/50 and showing no organic disease.

Class D.—All men not included in the foregoing three classes.

VI. MAGNETS.

It is thought wise to make this separate heading owing to the importance of magnets in ophthalmic surgery.

Some emergency ophthalmic surgery is possible with rather indifferent equipment, but nothing can take the place of the giant and small magnets in handling those cases in which a small magnetic foreign body is lodged within the globe. It was immediately apparent during the early visiting of hospitals that this was one of the most urgent and necessary articles of equipment, for, with only a few base hospitals thus equipped, it would be impossible for the ophthalmic service properly to handle this very important branch of the operative work.

A supply of magnets had been shipped, following a request by cable in the very early spring, but at first no trace of them could be found. They were finally located by the commanding officer of Intermediate Medical Supply Depot 3, as listed under roentgen-ray supplies.

This early supply was immediately expended by sending the magnets to the points where they were most likely to be needed in case of an emergency. Giant Lancaster and small Lancaster magnets were placed in the two forward evacuation hospitals (Nos. 1 and 2), large and small magnets were placed at Chaumont and Bazoilles, and these, with the similar equipment at Base Hospital 36, temporarily filled in the gap. A small Lancaster was placed with the giant Volkman already installed at American Red Cross Military Hospital 1.

No further magnets arrived for some time, so that in order to meet the very insistent demand from all base hospital centers not equipped, arrangements were made to build some giant magnets at the medical department repair shop in Paris. Specifications for such a giant magnet were furnished from this office, based on the specifications of the model used by the English service, and five unusually good giant magnets were turned out.

Fig. 2.—Group of blind soldiers at the Savenay school. Mr. Baker is seen standing at the extreme left in the back row and Miss Richardson at the right.

It is interesting to note that up to 1918 the B. E. F. had three eye centers equipped with magnets (Boulogne, Etaples and Rouen). These centers possess large but immobile giant magnets. To cover their other areas they had an ambulance which carried a large Haab magnet and a small hand magnet. Following

the arrival in France of U. S. A. Base Hospital 5, which was equipped with the large and small models of Lancaster magnet, the British took up the question of supplying more of their hospitals; and basing their work on the magnets of Base Hospital 5, they turned out a very satisfactory model. The plans of this British model were supplied to our division of ophthalmology.

About the time the first magnet was finished at the shop, Lieut.-Col. Nelson M. Black arrived in France, bringing with him five medium sized magnets. These, with a few extra Lancaster magnets, which arrived a little later, made it possible to place magnets at all the most needed points among the mobile and evacuation hospitals.

Many of these magnets have been of assistance in other branches of surgery, particularly in brain surgery.

The following suggestion is made for the future: In view of the wide usefulness of magnets and the imperative need of them for the removal of magnetic foreign bodies from the interior of the eye, and for the diagnosis of such cases, it is strongly urged that every base hospital in any expeditionary force be supplied with a giant and a small magnet. Experience has proved that these magnets, built according to the Lancaster design, or a similar one, are by far the best and most easily transported. At times when battle casualties are not to be expected, or when an army is on a peace footing, magnets are occasionally necessary, but could be much more widely scattered.

Magnet Cars.—Both the English and French have found that a motor car, with special body and equipped with a dynamo, run by the engine, so that a giant magnet could be carried about and furnished with a suitable and sufficiently powerful electric current, was very useful. Prior to the cessation of hostilities, various types of such motor cars were investigated by the senior consultant with the intention of recommending one for the medical department; but when the necessity for such a car no longer existed the project was abandoned. The urgency of such a portable outfit for the A. E. F. was lessened owing to the fact that our mobile hospitals had such electric current producing cars or had portable gasoline driven dynamos, delivering a direct current suitable for the magnets. Therefore, magnet equipments were placed with the more advanced and isolated of these hospitals.

VII. REPORTS FROM OPHTHALMIC SURGEONS.

Early in June a circular letter was sent from the office of the senior consultant in ophthalmology to all ophthalmic surgeons of the A. E. F., requesting them to send a monthly report of the work done in the department which they had charge of. The reports were generally sent in and proved very interesting, and a compilation of them was sent each month to the office of the Chief Surgeon.

Later in the summer when it was decided in the office of the Chief Surgeon to have reports sent in from separate departments to the director of professional services, a form for such a report was made up in the office of the senior consultant and submitted to the chief surgeon. A large supply of these blank forms was then printed and a number sent to each of the ophthalmic surgeons with the direction that two copies of the report be sent to the director of professional services, with the understanding that one copy would be sent by the latter to the office of the senior consultant in ophthalmology, so that a general idea of the work being done in the various hospitals could be ascertained and a compiled report could be sent to the chief surgeon each month.

MONTHLY REPORT OF OPHTHALMOLOGICAL SERVICE.

Hospital No... Month of.....191..

Type of Cases	No.	Remarks
Bed cases admitted to eye service	...	...
Eye cases cared for on other service	...	...
Eye cases seen in consultation, once or twice	...	...
New cases seen in out-patient's department, exclusive of a-b-c	...	...
Old cases seen in out-patient's department, exclusive of a-b-c	...	...
Number of enucleations	...	...

Number of eviscerations ....
Number of cases requiring use of magnet (intraocular) ... ...
Number of cases with magnetic foreign body in eye ....
Number of cases with nonmagnetic foreign body in eye ... ...
Number of intraocular foreign bodies removed with magnet ... ...
Number of gas cases with definite corneal ulceration ....
Number of cases blinded or with loss of useful vision (both eyes) ....
Number of refractions ....
Number of prescriptions for glasses ....
Total number of cases ....
Remarks:

.....

Ophthalmic Surgeon.

Instructions.—This report should be completed each month by the Ophthalmic Surgeon of each hospital and forwarded direct to the Director of Professional Services. Two copies must go to Director Prof. Services, GHQ, A. E. F., APO No. 706.

VIII. TRACHOMA SURVEY.

The division of ophthalmology was asked by the medical division of the labor bureau to make a survey of the administrative labor companies in the A. E. F., to determine the amount of trachoma and to suggest methods for its control. These labor companies were scattered over the whole of the A. E. F., from the air fields, close to the front, back to the base ports. This survey was completed in November. The eyelids of 12,641 laborers were turned, 261 cases of trachoma were found and upward of 1,500 cases of suspicious conjunctivitis. Measures were suggested for the handling of this problem.

Practically the whole of this survey was carried out by Lieut.-Col. George S. Derby, with the hearty and active cooperation of the medical division of the labor bureau. (See p. 500.)

A full report of this survey was submitted to the Chief Surgeon.

IX. ARMY OF OCCUPATION.

Major Ralph A. Fenton was nominated as ophthalmic consultant for the Army of Occupation and Lieut.-Col. Nelson M. Black from the office was detailed to advise with him in suggesting a plan for an eye service for this army.

The following suggestions have been submitted to the office and forwarded to the Chief Surgeon:

Lieutenant-Colonel Black suggests: (*a*) that a combined ophthalmologist and otolaryngologist (capable of passing on ordinary ophthalmologic conditions) be attached to each division; (*b*) that one field hospital from each division be selected to take care of minor eye cases; (*c*) that the more serious cases and all refraction work should be sent back to the nearest evacuation hospital; (*d*) that a center be established on the front at Coblenz and one on the line of communications, possibly at Treves, with the best eye equipment available, where the bulk of the eye work will be done and where the two optical units, recently asked for and sent, will be located.

It is possible that when conditions become more settled in the Army of Occupation, certain changes may have to be made in these plans to conform to a changing situation, and to changes in location of evacuation and mobile hospitals.

X. ORGANIZATION OF AN OPHTHALMOLOGIC SERVICE.

Suggestions.—The experience of the division of ophthalmology since it was instituted leads to the following suggestions for the organization of an ophthalmologic service:

On numerous occasions during the past campaign there was a shortage of men capable of doing ophthalmologic work, due to several factors. Ophthalmologists were not attached to all of the early base hospitals which came over, and to none of the evacuation hospitals, but the need of them in the latter was so urgent that the Chief Surgeon, at the suggestion of the senior consultant, cabled the request that a skilled ophthalmic surgeon be attached to all future evacuation hospitals to be sent over. For all the mobile

hospitals that were organized in France and the early evacuation hospitals, there were not enough casual ophthalmologists from home at first available. The need for a very considerable number of ophthalmologists in the expeditionary force is, therefore, evident; and it is not probable that the supply of fully capable men will ever reach the demand. Therefore, the available men must be placed where they will do the most good.

At the time the armistice was signed there were places where at least 150 ophthalmologists could be used to advantage in replacement divisions, mobile, evacuation, base and camp hospitals.

1. *Divisions.*—Certain of the divisions serving at the front have had an ophthalmologist on duty and have received the equipment necessary for refractive work, the treatment of disease conditions and for minor operations. Certain other divisions have asked that an ophthalmologist be assigned. If there were forty divisions in France at the close of hostilities, with more to come during the succeeding year, it is easy to see what a drain on the ophthalmologic forces it would be to put a man in each division. No eye surgery should be done in the field hospital. At the most, only minor cases, or mild gassed eyes, should be held there; and these may be treated by the medical officers on duty, following the instructions from the ophthalmic division. If, in an emergency, the advice of an eye surgeon is required, it is always possible to obtain one from the nearest mobile or evacuation hospital. Eye patients from the divisions who need treatment should be sent to the nearest mobile, evacuation or base hospital. Refraction work for the division should be done in the evacuation hospital or a nearby base hospital.

An exception to this is the replacement divisions. To each of these an ophthalmologist should be attached.

2. *Mobile Hospitals.*—An ophthalmologist should be stationed in every mobile hospital, and it has been the aim of the senior consultant in ophthalmology to accomplish this.

At the time of the Argonne campaign, five of the mobile hospitals functioning had men capable of doing the best type of eye surgery.

Mobile hospitals should be thoroly equipped to do eye surgery. They should be provided with the Army eye case of 1917, the auxiliary eye case, an electric ophthalmoscope, condensing lens, an electric flashlight and a large and small eye magnet, which, in these hospitals, can obtain current from the roentgen-ray circuit. While the actual number of eye cases will be small, the availability of skilled eye treatment may make the difference between sight and blindness.

In open warfare the number of eye wounds runs from 2 to 4 per cent. The ophthalmologist is a necessity in the mobile hospital, for experience has shown that only the exceptional general surgeon is sufficiently conversant with eye work. The ordinary debridement of wounds as practiced in war surgery is absolutely contraindicated in wounds of the ocular structures. The retention of all possible tissue in the neighborhood of the eye is necessary for its integrity. Enucleations and eviscerations of the globe are seldom properly done by the general surgeon and packing of the orbit with gauze, so commonly done by them, is absolutely unnecessary and pernicious. The extraction of magnetic intraocular foreign bodies and the decision as to the course of treatment to be pursued in the case of an injured eyeball are matters for the skill of the specialist. These functions have been carried out by the men attached to evacuation and mobile hospitals.

It is fully recognized that there is not sufficient eye work to occupy the whole time of an ophthalmologist in the mobile hospital or even in the evacuation hospital (except in peace time, when there is refraction to be done). He should be and, in many instances, has been placed as the second member of an operating team. All eye cases are referred to this team, and when it is necessary to perform an eye operation the position of the members of the team is reversed.

During all times the ophthalmologist may be and is often assigned to other duties. It is a basic principle that all eye men attached to mobile and evacua-

tion hospitals shall be prepared to undertake these other duties besides their eye work. During periods of stress, however, commanding officers of hospitals should not overload their specialists with so much work that they cannot attend to their special cases.

Mobile hospitals need not be equipped to do refraction.

3. *Evacuation Hospitals.*—What applies to the mobile hospital applies also to the evacuation hospital. This latter unit, however, being of a more permanent character, should be equipped to handle all varieties of eye work. In addition to the equipment necessary to the mobile hospital, the evacuation hospital should have a trial case and necessary charts and a hand perimeter. Refraction for the divisions should be carried out here.

During periods of stress, the ophthalmologist should be assigned as second man on a surgical team, and during peace times he should be able to devote the whole of his time to his eye cases.

Where two or three evacuation hospitals are situated in close proximity, only one need be fitted up to care for refraction work and the eye men attached may pool their outpatient work. Such a condition existed at Evacuation Hospitals 6 and 7 at Souilly for a period in 1918.

At the close of hostilities nearly every evacuation hospital in the field had an ophthalmologist attached, and, with the exception of eye magnets, had a fair, though hardly sufficient, equipment.

A competent ophthalmologist was, for a time, stationed at the principal gas hospital; and plans were made to cover the other gas hospitals from the evacuation hospitals in the neighborhood.

In periods of stress last summer and autumn the ophthalmic consultants from the headquarters at Neufchateau served at evacuation and mobile hospitals, as the supply of ophthalmologists was inadequate.

Optical service for evacuation hospitals has been discussed in the section of optical service.

4. *Base Hospitals.*—Each isolated base hospital should have an ophthalmologist attached, and this has been the case, except for a brief period in a few instances. Each one should also have the complete ophthalmic equipment listed for base hospitals.

The isolated base hospitals have taken care of all varieties of eye cases, except in some instances the magnet cases.

Base Hospitals 15 and 17 and Camp Hospital 27 have each an optical unit. In other instances prescriptions for glasses have been sent to the nearest unit, or to Paris.

Where the amount of work justified it in isolated base hospitals, the eye service was separated from the ear, nose and throat. Where the work was light, the two services have been united.

5. *Base Hospital Centers.*—Where base hospitals are close together, in groups of two or more, one of the hospitals should be selected as a center to receive all the eye cases sent to the group. All of the ophthalmic surgeons necessary to such a central clinic should be provided from the surrounding hospitals. Two or three ophthalmic surgeons can easily take care of all the ophthalmic work of five or six hospitals so that a number of hospitals in the group need have no ophthalmic surgeon. Whatever consultation eye work is necessary can be handled by calling in one of the men from the central eye clinic. Where this plan has been adopted, and has been established long enough to be put on a firm working basis, it has proved of great value. It saves special equipment and personnel. It must be obvious to anyone that a single good sized eye clinic, similar in design to the one mentioned and appended in the body of this report, would be far better, for instance, in a group of ten hospitals than to have ten separate sets of clinical rooms. Each such center should have one of the most competent ophthalmologists obtainable in charge of the work, and he can act as consultant for the surrounding area.

Such centers were established in Base Hospital 46 for the Bazoilles area and in Base Hospital 36 for the Vittel and Contrexeville areas, and progress was being made toward establishing centers at Allerey, Mesves and Mars. Additional

centers would have been established at Paris and Beaune, and in other areas, when the need arose.

Dec. 1, 1918, the division of ophthalmology had eighty-six ophthalmologists listed as serving in base hospitals.

6. *Camp Hospitals.*—The amount of eye service required in camp hospitals varies enormously according to the function of the hospitals. Camp Hospital 26, which served the First depot division for several months, ran in the neighborhood of 1,000 new eye cases a month, occasionally more. At this camp hospital the eye, ear, nose and throat work constituted a single service and there was enough work for three and sometimes four men. There was no base hospital close to Camp Hospital 26.

At some camp hospitals there was practically no eye work done and what little developed was transferred to the nearest base hospital.

The policy of the division was to join with the ear, nose and throat service and place a combined eye, ear, nose and throat specialist at isolated camp hospitals. Camp hospitals in the neighborhood of base hospitals transfer their eye work to the base hospitals.

Dec. 1, 1918, this division had listed twenty-eight men doing eye work in the camp hospitals. Doubtless there were a number more as all the camp hospitals had not been visited.

XI. ROUTING OF EYE CASES.

The centralization of eye cases near the front seems to be feasible to a certain extent and is highly desirable. Such an experiment was carried out in the early part of the Argonne campaign, with a certain degree of success in spite of the fact that the hospital chosen to receive these cases (Mobile Hospital 6) was in an inaccessible location and a long distance back of the front. As the line moved forward, it became practically impossible to route cases there on account of the great distance and its inaccessibility.

While this hospital was in operation, however, a very considerable number of eye injuries were treated there. An attempt was made to send to this hospital all cases with a head bandage.

From the ophthalmologic standpoint the establishment of such a hospital simplifies the work of the division of ophthalmology and increases the efficiency of the service.

A thoroly experienced ophthalmologist may be spared for such a position. Special equipment may be placed at his disposal. Moreover, such a hospital is very useful for training less experienced men in the handling of eye conditions seen in war. Eye cases, therefore, when possible, should be routed to special front line hospitals.

When eye cases are routed thru to the base hospitals they should bear some distinguishing mark in order that they may reach the eye center in the area to which they are to go. To accomplish this purpose ordinary baggage tags, with a large EYE printed on them, were supplied to the front line hospitals and ophthalmologists were instructed to tag their cases before evacuating them. This system gave promise of being of considerable help in properly distributing cases.

XII. CENTRAL EYE HOSPITAL.

After the organization of the ophthalmologic service a pressing need was felt for a base hospital that would have a large number of beds available for eye cases, where special equipment would be installed and which would be manned by a staff of experienced ophthalmologists.

Base Hospital 115, equipped especially for head cases, ear, nose and throat, facio-maxillary and eye cases, was designated as this special hospital.

A beginning had been made in routing to this hospital eye cases needing special observation and study and cases requiring extensive plastic reconstruction work. At this hospital were artists capable of making colored plates of especially interesting cases and a specially trained pathologist was also to be available. It was planned to send all eye pathologic specimens to this hospital for study and record.

XIII. TEACHING AND OBSERVATION.

It has been fully realized that war ophthalmology presents certain special features, a knowledge of which is of great importance for the eye specialist if

our wounded men are to receive the treatment which they deserve. Both the senior consultant and the assistant consultant had had a considerable period of service with the B. E. F. before serving with the A. E. F., and since then have had opportunities to see some of the work done by the French. The exigencies of the situation in France made it impossible to give many ophthalmologists opportunities for observation during the active period. Three men were sent for a period of time to observe in the principal British eye clinic, in France, and several more had an opportunity to see French work in various Paris hospitals. The others were instructed, as far as possible, by personal visits by the consultants and by means of circulars.

Two other men had an opportunity to see some of the British and French work before the senior consultant was appointed.

All of these men occupied important positions and their opportunities for observation in allied clinics were of considerable advantage to them.

Base Hospital 115 was also to have served as the eye teaching center for the A. E. F., where men could be sent for instruction, especially during the less active winter months. It was also intended that the men sent there for instruction should be classified as to their qualifications as ophthalmic surgeons. This was done to a certain extent with casuals assigned to this hospital. Had the war continued, Special Base Hospital 115, under the able management of Lieut.-Col. E. C. Ellett, who is so well known to all ophthalmologists in America, would have developed a very large and important eye center for instruction and qualification of Army ophthalmologists.

XIV. SUGGESTIONS FOR IMPROVING EYE SERVICE.

1. *Refraction.*—A great deal of unnecessary refraction work overseas could be avoided if a more careful ocular examination were made at home, a more careful record made of vision and refraction, and if a permanent record were to accompany the soldier.

The question of a permanent vision and refraction record was taken up by this office very early and a gummed record slip, similar to that used by the B. E. F., was printed and furnished with each pair of glasses.

The best way to preserve this record is to paste it inside the cover of the pay book in the case of enlisted personnel, while with the officers and others, it may be pasted inside the glasses case, or better, carried with the personal papers.

If this slip be fully made out a permanent record is preserved, and replacement glasses may be ordered without further examination.

2. *Equipment.*—(1) Army eye instrument case. Certain changes can be made in the army eye instrument case, which would add to its usefulness:

a. When the present supply is exhausted it would be wise to combine all necessary instruments in one case. Until that can be done changes in the contents of the 1917 case should be made, to make it more independent of the auxiliary case.

b. The eye speculum now in the 1917 case might be replaced by a nonmagnetic one of a different type.

c. Nonmagnetic forceps should be provided.

d. A pair of more suitable enucleation scissors should be provided.

(2) Auxiliary eye case. Certain changes should also be made in the auxiliary eye case, which would add to its usefulness:

a. The present cautery set should be done away with; and a Todd cautery, or other cautery of that type, should be substituted.

b. A Meller's speculum for excision of the lacrimal sac should be added.

c. In an Army eye case a small supply of necessary special drugs in tabloid form should be placed. These should include atropin, homatropin, eserin, cocain and fluorescein. These would take up very little space.

(3) Chest of eye equipment for base hospitals. It might be desirable to have standard chests capable of holding complete eye equipment for a base hospital. Such a chest should contain the following list:

Army eye case, 1917—with changes as noted.

Auxiliary eye case—with changes as noted.

1 flash light.

2 De Zeng electric ophthalmoscopes.

1 hand perimeter, with 6 dozen charts.

1 standard perimeter (for base hospitals only).

1 Zeiss, or Bausch and Lomb, binocular corneal loupe.

2 irrigators (New York Eye and Ear Infirmary type).

12 soft rubber ear syringes.

36 glass spheres (18, 20 and 22 mm.), 12 each.

1 set Jennings color vision test.

1 instrument rack.

1 complete set of test charts for distant and near vision.

4 different arrangements of letters.

1 illiterate chart.

1 reversed type chart.

1 chart beginning with a 20/100 letter.

3 frosted bulbs for retinoscopy and ophthalmoscopy.

1 extensible wall bracket for ophthalmoscope light.

12 prescription pads with carbon copy.

1 complete set of directions for vision testing and record keeping should be in every instrument case and trial lens set.

1 copy of Manual 3 and one copy of Manual of Ophthalmology (Surgeon General's Office).

2 eye magnets, one large and one small (Lancaster type), with electric foot switch and necessary connections should be furnished, but packed in separate box, on account of their weight.

3. *Personnel.* — All ophthalmologists should be tried out and carefully graded in the United States before being sent on foreign duty; and their records should be sent over with them, or in advance of them.

The following is the station list of the ophthalmologists with the A. E. F., Dec. 1, 1918:

Headquarters Medical and Surgical Consultants, A. E. F.—Neufchateau.

Lieut.-Col Allen Greenwood (Senior Consultant).

Lieut.-Col. George S. Derby (Assistant Consultant).

Lieut.-Col. Nelson M. Black (Consultant attached to Headquarters, Medical and Surgical Consultants).

Army of Occupation.

Major Ralph A. Fenton (Consultant).

Tactical Divisions.

5th. Capt. A. R. Kidd.
77th. Lieut. Reddy.
83rd. Lieut. A. S. Rochester

Mobile Hospitals.

4. Capt Lawrence Post (Ophthalmologic on surgical service).
5. Major J. B. Corser.
39. Capt. A. H. Little.

Evacuation Hospitals.

1. Major G. I. Hogue (Consultant, Toul Area).
2. Capt. Ernest Rau.
3. Lieut. G. A. Peacock.
4. Lieut. C. M. Buckner.
5. Capt. Harry V. Judge.
6. Capt. H. E. Keely.
7. Lieut. R. E. Riemers.
8. Capt. E. G. Foote.
10. Lieut. Moncrieff.
Capt. S. I. Ebers.
11. Capt. Andrew Hunter.
12. Lieut. A. I. Arenson.
13. Lieut. J. J. Zimmerman.
14. Lieut. H. H. Ainsworth.
15. Lieut. J. M. Severson.
16. Lieut. C. C. Cowan.

Base Hospitals.

1. Capt. W. W. Weeks.
Lieut. H. L. Pelle.
2. Capt. L. W. Jessamen.
3. Lieut. Cyril Barnert.
6. Major Alex. Quackenboss (Consultant, Base Section 2).
Capt. Ralph Hatch.
7. Capt. A. B. Connor.
8. Capt. Roy Connor (Consultant, Savenay area).
Lieut. Fuller.
9. Lieut. Roy Parkinson.
10. Lieut. J. H. Roth.
12. Major Adam Sherman.
13. Lieut. Andrew Carr.
14. Capt. M. H. Powers.
Lieut. E. B. Fowler.

15. Capt. G. H. Grout.
    Lieut. R. E. Sullivan.
17. Major D. A. Campbell.
18. Capt. Lloyd B. Whitham (Consultant, Bazoilles area).
20. Capt. Claude McKee.
21. Lieut. C. R. Farham.
22. Major Herbert Walker.
    Capt. H. B. Orton.
24. Capt. Charles A. Bahn (Consultant, Limoges area).
25. Major Clarence King (Consultant, Aleray area).
26. Lieut. S. T. Forsythe.
27. Major S. Smith.
28. Capt. J. W. Kimberlin.
29. Capt. W. C. Finnoff.
30. Capt. N. P. Wood.
31. Capt. J. D. Washburn.
32. Capt. W. H. Post.
34. Lieut R. J. Sprowl.
35. Lieut. S. H. Jesburg.
36. Major J. M. Patton (Consultant, Vittel-Contrexeville areas).
37. Major E. P. Odeneal.
    Lieut. H. R. Miller.
38. Capt. J. R. Forst (Consultant. Nantes area).
40. Capt. R. Rockhart.
41. Capt. J. W. Burke.
    Capt. Frederick Falk.
43. Capt. C. L. Kaucher.
    Lieut. M. S. Equen.
44. Lieut. W. D. Rowland.
45. Capt. R. Wright.
46. Lieut. Chas. E. West.
47. Lieut. H. A. Fletcher.
48. Captain L. E. Hetrick.
50. Capt. A. E. Mattice.
53. Capt. O. P. Bennett.
55. Capt. John F. Edwards.
56. Capt. Walter F. Macklin.
57. Capt. J. Stanford.
58. Major George W. Jean (Consultant, Rimaucourt Center).
60. Capt. J. W. Earel.
61. Capt. Robert H. Fowler.
    Lieut. George H. Lang.
62. Lieut. J. F. Herbert.
65. Capt. William A. Cook.
66. Lieut. R. S. Beam.
67. Lieut. M. W. Blair.
69. Capt. Thomas H. Curtin.
    Capt. H. B. Lemere (Mesves Hospital Center).
    Capt. B. F. Baer, Jr. (Consultant, Mars Hospital Center).
70. Lieut. Ralph L. Daniels.
76. Capt. Alfred W. Haskell.
77. Capt. Henry Stanbery.
80. Lieut. Frank C. Leavitt.
81. Capt. C. E. Rayburn.
82. Capt. George Mytinger
84. Capt. B. H. Jenne.
88. Capt. C. E. Connor.
101. Capt. Robert Beattie.
105. Capt. A. E. Ibersoff.
114. Capt. C. N. Sneed.
115. Lieut.-Col. E. C. Ellett (Consultant, Vichy Hospital Com. area).
    Capt. L. M. Francis (In charge of Ophth.).
    Capt. C. A. Burkholder.
    Capt. Carl Fisher.
    Capt. H. B. Searcy.
    Lieut. Grady E. Clay.
    Lieut. G. A. Poux.
    Capt. Alan C. Woods.
116. Lieut. H. B. Chandler.
202. Capt. A. D. McCornachie.
204. Lieut. F. A. Millet.

American Red Cross Military Hospitals

1. Capt. F. W. Shine (Consultant, Paris area).
    Capt. A. G. Fewell.
2. Lieut. W. B. Doherty.
3. Lieut. E. D. Loughran.
4. Capt. Earl B. Brooks.
5. Lieut. Lyman A. Copps.

Camp Hospitals

3. Lieut. Nicholas Edrington.
4. Capt. F. G. Sprowl.
    Capt. E. R. Sibley.
7. Capt. George W. Boot.
8. Capt. Snyder Maiden.
9. Capt. F. B. Harding.
12. Lieut. J. F. Herbert.
13. Capt. E. H. Vine.
14. Capt. F. P. Herrod.
15. Capt. Martin Crook.
19. Capt. A. G. Mathewson.
26. Major C. F. Jump.
    Lieut. Cecil Stockard.
27. Capt. E. H. Cooper.
99. Capt. E. E. Straw.
31. Capt. J. H. Shaw.
33. Lieut. M. J. Weiss.
34. Lieut. E. R. Cotham.
36. Lieut. W. Bishop.
37. Lieut. Cady.

38. Lieut. E. F. Stroud.
40. Capt. R. J. Bullard.
42. Capt. E. L. Titus.
48. Capt. Ira J. Magee.
50. Capt. Frank I. Powers.
68. Lieut. Porter Hopkins.

Chief Surgeon's Office, Base Section 5.
Capt. E. A. Looper .....

Attending Surgeon's Office, Paris.
Capt. W. D. McKenna .....

Attending Surgeon's Office, Army Schools.
Capt. John B. Smyser .....

Chief Surgeon's Office, Base Section 3.
Major William T. Shoemaker..
(Consultant.)

PENETRATING AND PERFORATING WOUNDS OF THE EYEBALL WITH DIAGNOSIS AND TREATMENT OF RETAINED FOREIGN BODIES.

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PHILADELPHIA.

This paper gives a general survey of the character of the wounds of the eyeball, encountered by the ophthalmologists of the American Expeditionary Forces, and discusses the treatment judged most appropriate for each class of cases. It was read before the American Ophthalmological Society, June 14th, 1919.

Wounds penetrating or perforating the eyeball as seen during the war, present a number of interesting lines for discussion. If the eyeball is sufficiently destroyed from rupture, removal—incomplete or complete—is necessary; and if vision is totally lost from hemorrhage or intraocular damage, removal may be advisable. In these cases, the only question is the advantage or disadvantage of one of the several methods, and the selection of the best method for that particular case. If the eyeball is not destroyed, but contains a foreign body, discussion might be endless upon the various procedures to be practiced. First, a determination of the character of the F. B. whether magnetic or nonmagnetic. Second, its size and location as shown by the X-Ray. Third, if magnetic, the best way to attack it, whether by the anterior or the posterior route; the best sort of magnet, and the best technic. And fourth, if nonmagnetic and otherwise inaccessible, shall it be allowed to remain, or shall the eyeball be removed; in other words, judgment on the dangers of sympathetic opthalmia. The totally destroyed eyeball—and the majority of them with us were in this class—has been well described by Col. Lister and others. It presents little interest, and offers but little opportunity for anything but ordinary skill and judgment. Such eyeballs were often primarily eviscerated, and the accompanying conditions were mostly compounded comminuted fracture of the orbital and other bones of the face and skull, laceration and destruction of the the lids, conjunctiva, etc. Brain substance was frequently lost thru a fracture of the orbital roof; and frequently the ethmoidal sinuses, the antrum, and the orbit, were thrown into a common cavity. Swelling and infiltration were intense, and the only practical operation was a cleanup operation. The foreign body, generally near at hand, was sometimes far removed from the domain of ophthalmic surgery. For example, in one case, a large piece of shrapnel had passed from before, backward, completely through the eyeball and orbit into the brain, and rested there beneath the cortex in the temporal lobe, just in advance of the ear. By a partial exenteration of the orbit and the aid of an ordinary large nail as a tip introduced through the wound of entrance, I was able to recover the F. B. with the hand magnet. The

patient made a good primary recovery and went to Blighty, apparently little the worse for the wear. What has happened since, I do not know. When possible, I enucleated completely what was left of the badly ruptured eyeball, with the feeling that recovery was more quickly reached in this way than by allowing the eviscerated sclera, or any part of it, to remain. Col. Lister favored the retention of a button of sclera next the nerve, to avoid opening the nerve sheath. While fatal meningitis and sinus thrombosis following enucleation for panophthalmitis is possible, and theoretically a danger, it must be an exceedingly rare occurrence.

Noyes[1] concludes that "while a small risk of life is incurred by enucleation, about 1 in 4,000, the supposed increase of risk by the existence of suppurative panophthalmitis is not so far justified by the facts, as to bar its performance under these conditions. Neither when proper indications arise, need we on this account hesitate to do the operation.

Kontrowitsch reviews the literature to 1912, and concludes that on the whole, enucleation is a fairly safe procedure. Darrieux holds that in traumatic panophthalmitis, enucleation is the operation of choice, while in other forms of panophthalmitis, that operation offers no greater danger than any other operative procedure.

I have seen one case of suppurative meningitis following enucleation for panophthalmitis. That was 19 years ago. And more recently I had a case of beginning sympathetic ophthalmia, following enucleation in which a button of sclera had been allowed to remain. The condition promptly disappeared when the sclera was removed. To this case, however, belongs an explanation. The eyeball had been imperfectly enucleated, and the operator had cut thru the sclera of a collapsed eyeball instead of thru the nerve. Naturally, the stump contained portions of retina and choroid, which may well account for the subsequent trouble. It emphasizes, however, the importance of thoroly disposing of all but sclera when we eviscerate. In my opinion, complete enucleation in these cases is the preferable operation, irrespective of the septic or nonseptic condition of the eyeball. It is important to conserve as much of the lids and conjunctiva as possible, as the end results of such extensive palpebral, orbital, and bulbar injuries as occurred in the War, are often most disappointing. Regarding the shattered fragments of bone, it does not require much of an attachment for them to be usefully retained. Therefore, only the very loose and apparently totally detached pieces should be removed. In the treatment of these crude traumatisms, I found dichloramine T in eucalyptol of the greatest value. It was used very freely, gauze soaked in it being loosely packed into all cavities and recesses, and all parts of the wound and its surroundings sprayed with it. Return of the tissue toward the normal was surprisingly rapid and in no cases were bad effects noted. Great benefit, I believe, resulted from its free use.

The intraocular foreign bodies demand removal, when such is practical, as soon after the injury as possible, and with as little additional damage to the eyeball as necessary. Removal by forceps from the vitreous can scarcely be considered as practical, because, when successful, it is more a question of luck than skill. If large enough to get, we might as well take the eyeball. The metalic substances encountered in these injuries were iron, steel, copper, lead, tin, brass, nickel, aluminum, mixed metals, and I presume others. Then, of course, eyes were injured by stone, gravel, glass, china, wood, or anything in the neighborhood. While but two of these substances are magnetic, I would say that fully 50% or more of my cases of intraocular foreign bodies were in this class. As to this point, there is a wide difference of opinion, based on the personal experience of different workers, and the true percentage value of the magnet can only be reached later, by a careful study of innumerable records. In this connection, mention is made of a re-

markable statement from L. Vernon Cargill (1915) that he found the electromagnet of no use in either the South African or the present war. He had but one case of magnetic foreign body.[2]

As is well known, the eyeball was more tolerant to metals which became more or less sterile in transit, than to foreign bodies secondarily projected from the ground or surroundings. Injuries from stone and gravel, sand, etc., were as usual particularly disastrous.

The X-Ray with a certain amount of localization was essential. I say certain amount, because, if the F. B. could be definitely located within the eyeball, its mathematically exact position within the eyeball, to my mind, made little difference in many cases. This is particularly true of foreign bodies in the vitreous, and according to Whitehead, 75% of all intraocular foreign bodies are in the vitreous. Such a diagnosis was in most cases sufficient, but in some cases, a more exact localization was very desirable. The British hospitals were wonderfully equipped in the eye service, thanks to Col. Lister, and excellent localizations by the Makensie-Davidson method could always be obtained without too much trouble. Furthermore, a giant magnet, mounted in a motor ambulance, was always anxious to travel anywhere in the area if needed. No. 16 General Hospital, B. E. F., staffed by Pennsylvania Base Hospital 10, was weak on X-Ray localization, but it had a very satisfactory hand magnet that could recognize iron or steel if given a chance. The practical way of determining whether or not the F. B. was magnetic, was cautiously to try the hand magnet near or against the eyeball. This can be safely done if the eyeball is strongly rotated and the magnet first approached near the equator, and this zone tried out in all portions. If magnetic, the patient will unerringly feel a slight pull or at least a sensation. This is true of even very small foreign bodies, and for obvious reasons is a much safer procedure with a small than with a giant magnet. If the eyeball contained a visible open wound of entrance, immediate application of the magnet tip in the wound, irrespective of its position, was all that was necessary.

In my experience intraocular foreign bodies from war injuries are usually larger than those ordinarily found in civil practice due to industrial accidents. Hemorrhage and destruction are frequently overwhelming, and removal of the foreign body with retention of a blind eyeball, is often all that can be expected.

Regarding the size of war foreign bodies, the statistics of Morax and Moreau[3] are interesting. Sizes were arbitrarily divided into three classes: small, weighing less than .25-.30 gram; medium, .30-5 gram; and large, weighing more than 5 gram. Of a total of 486 injuries, 54% were by small fragments, that is, fragments weighing less than .30 gram.

The more important cases are those of small F. B. with a minute or closed wound of entrance, and with comparatively little hemorrhage or destruction. The foreign body has been localized and is known to be magnetic. It is in the vitreous, has passed through the sclera, and the anterior segment of the eyeball is uninjured. Will you remove it by the anterior route or by the posterior route? Will you use a giant magnet by the Haab method, or a good hand magnet; or a giant magnet used as a hand magnet? It is only fair to say that my experience has been almost entirely with the small magnets, notably, the Parker and the Sweet, but I feel that either of these magnets, if properly used, can be relied upon to get almost any free magnetic foreign body within the eyeball. Of course, in war work, the foreign bodies were practically all free from surrounding exudate. Nor is the actual strength or pull of a magnet alone the index of its efficiency. As shown by Lancaster[4], the tip is an important factor. He found that a short conical tip gave the best results. Sweet found, in testing the relative strength of the Haab, the Hirschberg, and his own magnet, that at 2 mm. distance, his own was su-

perior, at 5 mm., the Haab was stronger, but not markedly so; while at 10 mm. or more, the large magnets were decidedly superior. There are other mysterious qualities of magnets which if considered should induce the surgeon in a given case to think more of the foreign body, its size, shape, and location, and the damage already done to the eyeball, rather than of the magnet alone. In other words, it is a mistake to feel that either the large or the small magnet is always the best in every case. The facility with which the small magnet can be handled, and the greater extent of the eyeball over which its tip can be applied, are distinct advantages, and might in certain cases outweigh the advantage of greater power. It is perfectly true that those who habitually use the small magnet often wish for more power. Then is the time to call on the giant, but I would still stick to the posterior route for all bodies in the vitreous entering through the sclera. If the anterior segment of the eyeball is intact and uninjured, I certainly would not injure it by dragging a foreign body from the vitreous into it, and then further injure it by taking the foreign body from it. We all know how the F. B. is supposed to come into the anterior chamber, but we also know that sometimes it is clumsy and spoils a perfectly good lens or iris in its transit.

There would seem to be little danger in a sclerotomy, and while increased or serious hemorrhage might result, it is certainly not to be greatly feared. A posterior sclerotomy, when indicated, can be done with reasonable safety.

Finally, what is to be done with eyes containing nonmagnetic bodies in inaccessible positions, or foreign bodies we have failed to remove? The universal teaching a few years ago made the removal of such eyes obligatory. Not to do it was then malpractice. To do it now, per se, is practice equally bad. It all hinges on the question of sympathetic ophthalmia, and I know of no disease that has so failed to make good during the war, with such unlimited opportunity, as has sympathetic opthalmia due to the retention of a foreign body within the eyeball.

Parson's summary of the situation is very illuminating, and helps a great deal in deciding the proper disposal of these cases. The best theory for the disease, he thinks, is the transmission of an unidentified, specific organism by the blood steam, the socalled metastatic theory. The site and nature of the wound are potent factors, and not the mere retention of the foreign body. A sterile foreign body does not itself cause sympathetic opthalmia, but secondary infection may do so. Any wound involving incarceration of the ciliary body or capsule is dangerous. He does not think that the mere retention of a sterile foreign body, whatever its nature, is of any importance at all so far as sympathetic opthalmia is concerned.

Collins has also learned from experience that an aseptic foreign body implanted in the eye and chemically inert, causes no disturbance apart from the wound of entry. When sympathetic ophthalmia arises, it results from the nature or infection of the wound.

These statements from such authorities allay much of the former anxiety over cases in which we have failed to recover foreign bodies from the eye, and we must, as they indicate, pay more attention to the nature and condition of the wound of entrance.

In the discussion before the R. O. S. of G. B. where these statements were made, the question was asked, by what means one could know when sympathetic ophthalmia was likely to occur. Mr. Arnold Lawson gave in reply four very important factors always to be kept in mind.

1. Prolonged and intractable cyclitis or general uveitis, which goes on for week after week in spite of treatment.
2. The gradual supervention of an increasing lowering of the intraocular tension, which is always accompanied by progressive failure of sight.
3. Continual photophobia and sympathetic neurosis affecting the other eye.
4. The condition of the blood count.

Hypotony he regards as perhaps the most important danger sign, and lays great stress on the importance of a considerable increase in the mononuclear cells in the blood (S. H. Browning).

T. R. Gifford believes mononucleosis to be a reaction of the body to a chronic inflammatory process in the eye of any kind, and concludes that its presence does not specifically indicate the presence or the imminence of Sympathetic Ophthalmia.

The danger of the three other conditions, I think is well established, and in the presence of any one of them the indication for enucleation is clear. Nor should we forget that enucleation is only an absolute preventive if done before the sympathetic process, whatever it might be, is created. While there is a great tendency to refrain from destructive surgery, we might profit by the experience of the general surgeon in his treatment of malignant disease, and if an eye is blind or practically so, materially reduce its supposed valuation.

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OCULAR COMPLICATIONS OF PERIPHERAL EPILEPSY

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This paper gives the relative frequency of ocular symptoms with epilepsy, and reports cases in which seizures were attended with intraocular hemorrhage and loss of lid movements.

Up to the present, not even among the number of epileptics which I have under my care at the Government Hospital for the Insane, have I been able to find two cases as curious as the ones that I am about to describe, chosen from my private practice.

But before doing so, let us look over the symptoms of ocular complications in epilepsy. For the sake of clearness I have made the following table.

Symptoms Before the Seizure.

I. Purely Subjective.

a. Visual sensations of light.
b. Visual sensations of color.
c. Visual sensations of flames or flashes.

Symptoms During the Seizure.

II. Purely Objective.

a. Forced deviations of the eyes.
b. Pupillary changes. Contractions or Dilatations.
c. Pallor or hyperemia of the disc.
d. Vessels—contracted or dilated.

Symptoms After the Seizure.

III. Subjective and Objective.

a. Strabismus, nystagmus, diplopia.
b. Lowered visual acuity.
c. Lag in perception.
d. Transient concentric contractions of visual fields.
e. Subconjunctival ecchymosis.

These symptoms are not all present in every given attack of epilepsy. As a rule only a few can be detected. Ball[1] claims that the subjective, the auras, are the more frequent. Rodiet, Pansier and Cans[2] find the permanent disturbances to be: pallor of the optic disc and retina, probably anemic, passive venous congestion of the fundus with pale disc; often intense blackish pigmentation of the retina and choroid; irregular contraction of the visual fields, in cases of long attack; optic neuritis or advanced gray atrophy. At the close of an attack there is likely to be corneal anesthesia and dilated pupils. Rodiet and Bricka[3] report their observations on 2 cases of Jacksonian epilepsy, one showing optic atrophy due to meningitis and the other[4], choked disc due to gumma.

The following table shows the results of my observations on 41 cases of inmates suffering from epilepsy and the relative ocular complications found.

Years	1914	1915	1916	1917	1918	Total
Number of Cases	5	7	6	11	12	41
Subjective symptoms	4	5	4	8	7	28
Deviations of eyes	2	3	3	4	6	18
Pupillary changes	3	5	4	7	7	26
Fundus changes	1	1	2	3	2	9
Muscular changes	1	1	2	1	1	6
Visual changes	2	3	3	4	5	17
Field of vision	1	1	2	3	2	9
Ecchymosis of conjunctiva	0	1	0	1	1	3

As will be seen more than one-half of the cases complained of visual sensations commonly of light. Next in order, the pupil, reacted by contraction or dilatation in more than one-half of the cases, also. Deviations of eyes were not uncommon, 18 out of 41. Vision was disturbed in 17 cases. Nearly all of these cases were unable to read better than 20/200 for a period lasting from one to seven days after the seizure. Normal vision was gradually recovered in every case. Errors of refraction were present in 13 cases.

7 Simple hypermetropic astigmatism.
3 Simple myopia.
3 Mixed astigmatism.

Out of the remaining 28, two cases were presbyopic; seven were slightly hypermetropic in one eye; one had a complete leukoma of traumatic origin, and the rest were normal.

Generally the fundus changes were, hyperemia of the disc during the first two or three days following the attacks, and pallor, remaining until recovery. The vessels behaved unsteadily. In only one case was I able to examine the fundus during the fit. I had, however, great difficulty in doing so, and the results could not be taken into consideration.

Visual contractions of the field took place in 9 cases. As a rule the contractions were concentric, but irregular in outline and of a transitory character.

Traumatic sequels were rare. Only 3 cases of ecchymosis were recorded. There may be a reason for this. These patients are always under surveillance; and as soon as they express the probability of the coming of a seizure, they are taken to safety and strictly watched. This is not the case with epileptics out of hospital or colony control. Their fits may overtake them at any place, and they usually fall to the ground, injuring themselves, until they are carried to the nearest emergency clinic.

Much has been said and a great deal of time has been devoted to the study of ocular influence upon epilepsy.

Hubbell[5] made a study of the relation of socalled ophthalmic migraine to epilepsy. After all his experiments he was not able to prove a real pathologic kinship.

Hodskins and Moore[6] report the results of keeping 88 epileptics completely under the influence of atropin for one month, and comparing the average of seizures during that month with those of the four months preceding and the month following, when not under a cycloplegic. The average for the maximum month was 19.6, for the minimum month 6.1, for an average month 13.2, and for the month under atropin 12.6 per patient. They "firmly believe that the role played by ocular defects in the causation of epilepsy is a very modest one.[7]

Kinderman[8] reports a case of epilepsy caused by the retention of a piece of the optic nerve and choroid in an orbital cavity from which the eye had been removed. After these structures were excised the patient recovered. The irritation of a retained piece of retina, could, according to Kinderman, originate the epileptic attacks, thus resembling peripheral epilepsy.

Neeper, Gould, Bennet, Ranney and Stevens have all made experiments on patients suffering from epilepsy and having refractive errors. They could not prove that ocular defects could

initiate or by their presence aggravate epileptic seizures. Even the correction of the refractive errors did not play an important role in the results of the combined treatment. Such has been my personal experience.

CASE 1. R. H., 55 years of age, White, single, a lawyer and notary public. Two years ago he was referred to me by his family physician after an attack of epilepsy. Since then I have seen him five times.

The family and early history of this case are very obscure.

He has been examined by different specialists and the reports of their examinations prove that the brain and nervous system are the only centers really affected.

All laboratory findings are negative. The urine shows a tendency to low specific gravity.

A number of radiographs were taken with negative results.

PECULIARITIES OF THIS CASE.—Apart from a few subjective sensations of light, before the attacks, and a concentric irregular contraction of the visual fields, after the attacks, this case is interesting because there has always been present, after every fit, a profuse hemorrhage into the anterior chamber of both eyes, accompanied by a total subconjunctival ecchymosis.

This condition usually lasts from twenty to thirty days; when it completely disappears, leaving no trace of the profuse flow of blood. The concentric contraction of the field can be detected for a few days after. This also completely disappears. The eyes recover, and become normal in every respect between the attacks.

TREATMENT.—Atropin and dionin, local applications of heat, leeches to the temples, and purgatives. Protection from light, a special diet, and rest were advised.

CASE 2. Mrs. X. X. 59 years of age, white, married.

Family history. Father and mother died of old age.

Personal history. Measles and intestinal disturbances of childhood.

Present condition. The patient suffers from gastro-intestinal irritation, liver and kidney troubles (hepatitis and a slight albuminuria). She is alcoholic and a heavy smoker. She suffers from periodic attacks of peripheral epilepsy.

Laboratory findings as to syphilis, tuberculosis, lepra, etc., are negative.

Radiographs only show an area of induration of the skull over the right temporal region.

I have seen her three times after the attacks of epilepsy and there has always been present a paresis of the orbicularis, with ptosis of the lower lid and complete anesthesia of the skin over the inferior palpebral region and zygoma. This condition lasts for a period of twenty to thirty days and gradually disappears, leaving no trace of the disturbance.

Treatment included massage, electrical stimulation and general care of the nervous manifestation.

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AN INFECTIOUS GRANULOMA OF THE LACRIMAL GLAND.

DAVID W. WELLS, M. D., F. A. C. S.

BOSTON

This is the report of a case, suspected of malignancy; but in which the excised tumor proved to be a granuloma.

The patient was referred to the writer April 10, 1916, by Dr. F. L. McIntosh. Professional woman, aet. 53, of full habit. Left upper lid slightly edematous, palpebral fissure narrow, and upward excursion of lid somewhat limited but motion of the globe good in all directions. Palpation revealed hard mass in outer roof of orbit, region of lacrimal gland (not adherent to orbit.) Patient discovered it a few weeks previous with finger, no pain, but tender to touch.

Refraction Right — 2.50 ⌒ — .50 C. 105° V = .8.

Refraction Left — 2.50 ⌒ — 1.50 C. 25° V = .8. Was wearing o. u. —2.25.

No fundus lesion. Skiagraph showed well marked shadow extending into orbit about 1 cm. Urinalysis negative. Blood pressure maximum 160, minimum 100. No other glandular involvement detected. Wasserman reaction negative. Von Pirquet mildly positive.

Family and personal history: Typhoid aged 40. Diptheria at 45 with myocarditis. Menopause at 50. Father died at 48 of "stomach trouble"; was a professor. Mother died at 72 of successive shocks. No tuberculosis in immediate family. Paternal uncle died of miliary tuberculosis following exposure in Southern prison during the Civil War. Paternal aunt died of miliary tuberculosis aged 26. Patient is the oldest of eight children, four of whom died in infancy. Mother was ninteen when married and had eight children in 10 years. At school, patient was bright but not brilliant, powerful will and abnormally studious and persevering. When 18 years old father died, assumed responsibility of family, whom she supported by becoming bookkeeper and confidential cashier in large business house. At same time earned college degree in absentia, and managed two other business affairs, making great financial success for 25 years. Then came financial loss, with tremendous nervous strain in settlement of affairs. Studied abroad and took degrees in two Eastern colleges.. Professor in a Woman's College. Patient in good health until present illness. Nervous breakdown following period of depression after mother's death March 1916, one month before first seen by writer. Is very apprehensive and melancholic.

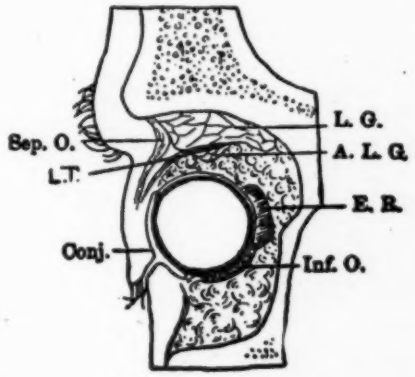


Fig. 1. L. G., lacrimal gland; A. L. G., accessory gland. The expansion of the levator is seen between these. E. R., external rectus; Inf. O., inferior oblique; Conj., conjunctiva; Sep. O., septum orbitale, L. T., levator tendon.

Diagnosis, probably sarcoma. Immediate operation advised.

Operation: April 18, 1916, assisted by Dr. J. E. Briggs. A very satisfactory rectal anaesthesia was administered by Dr. Mary A. Leavitt. The absence of the ether cone is a great advantage in all operations about the eye. Eyebrow was shaved, incision about 2.5 cm. long just under roof of orbit, beginning 5 mm. inward from center of cornea and extending to outer margin of orbit. Tumor was not adherent to periosteum and seemed to be well encapsulated, so that it was

easily dissected out. Conjunctiva, and accessory gland were exposed but as latter appeared normal it was allowed to remain. Stump was ligated before excision. The fascia of lower edge of wound was sutured to periosteum, and skin brought together with interrupted sutures. Silk worm gut drain was removed the next day. Healing uneventful, skin sutures removed on the third day. At this time there was complete ptosis, lid edematous. As levator tendon passes between the two portions of gland a lateral portion of it must have been excised with the tumor mass, altho it was not recognized.

Fig. 2. Result of Excision of Granuloma of Lacrimal Gland (Wells' Case).

On the eleventh day lid could be lifted 3 or 4 mm. towards the inner canthus, and in a month the ptosis was not noticeable. After three years there is no recurrence and there is almost no deformity. The photograph (Fig. 2) really exaggerates the depression. Patient has noticed no lack of tears.

Diagnosis of Excised Tumor.—Dr. W. H., Watters, Mass. Homeopathic Hospital reported: "The tissue received consists of an oval rather soft lobulated mass 1.5 cm. in greatest diameter by about 1 cm. in thickness. On section the mass is found to consist of a grayish white tissue somewhat irregular in arrangement and without any definite limiting membrane. The cut surfaces are practically uniform thruout in both color and consistence.

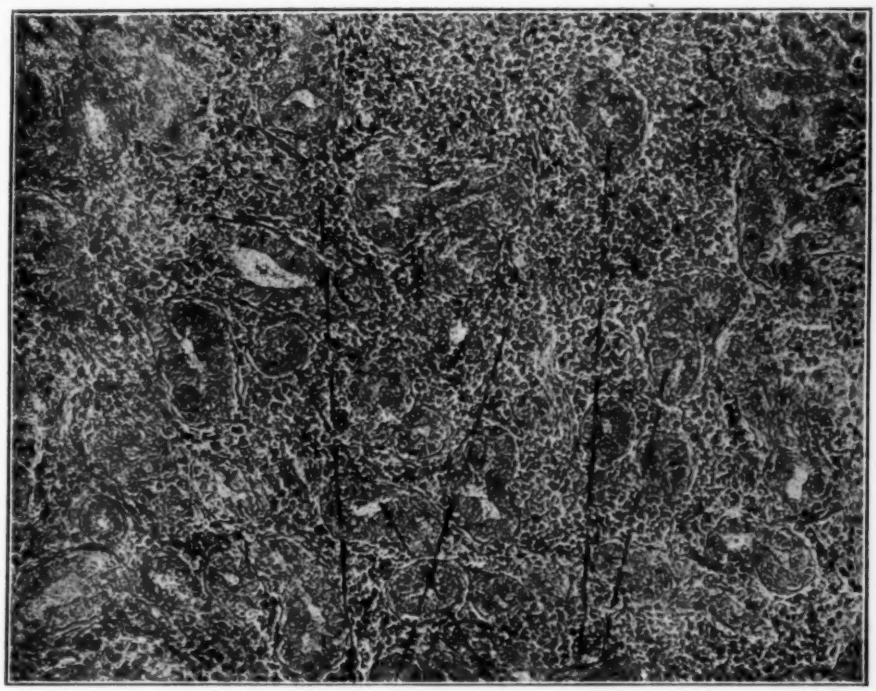
Microscopic Examination.—The major part of the specimen consists of a fibrous stroma varying in density in different places. This forms the supporting frame work for rounded and oval collections of irregular branched tubular glands. Some of these collections are small, others are very prominent. The glands vary somewhat in size and shape, for the most part corresponding to the tubular type. They are lined by a single layer of rather high cuboidal cells and present relatively small lumina. In almost all places the differentiation between the epithelium and surrounding tissue is sharply defined. In one small part of the mass, however, when examined by frozen section, a condition very similar to a typical cell proliferation outside the gland is noted. This is not further corroborated in other parts of the tissue.

The interglandular tissue consists of some fibrous elements, numerous blood vessels and large numbers of small round cells similar in size and shape to lymphocytes. These vary in number from place to place in the sections, sometimes being so numerous as to form distinct collections, partly obliterating the gland structure. In one part of the mass received there is practically a complete absence of glands, the tissue here consisting of the more firm fibrous elements arranged in irregular bands. Some glands are here dem-

onstrable however. In this part scattered without order or definite regularity are found collections of larger flattened and oval cells corresponding to the socalled "epithelioid" cells. These are collected in oval and rounded masses and present in the interstices distinct degenerative change. In some places in these masses multinuclear giant cells are found. On account of the presence of these structures a diagnosis of tuberculosis seems fully justified. Moreover, her Wasserman reaction was negative both in this laboratory and when it was examined as an entirely unknown specimen in another laboratory. The skin test for tuberculosis was mildly positive.

Dr. F. H. Verhoeff, Mass. Eye and Ear Infirmary, examined the slides, and is of the opinion that the condition is certainly either tuberculosis or syphilis of the lacrimal gland. Judging by the extensive necrosis, the diffuse formation of granulation tissue, and the marked endarteritis present, however, he believes it in all probality is a gumma.

Dr. F. B. Mallory, Boston City Hospital says: "I have gone over the sections of the lacrimal gland once more, and also restained one of the slides for tubercle bacilli. I could find none. The lesions are more vascular than I should expect in a tuberculous lesion and mitotic figures are fairly frequent. Histologically the lesion certainly suggests syphilis but I cannot be positive. I should advise the therapeutic test, that is, potassium iodid and perhaps mercury. If any lesion still persists a guinea pig should be inoculated in order to make a further test for tuberculosis."



Small round cells. Gland tubules.

Fig. 3. Section from center of gland showing diffuse inflammatory infiltration.

As after three years there has been no clinical manifestation of syphilis, tuberculosis or malignant disease, the only diagnosis tenable is Infectious Granuloma.

LACRIMATION.—As previously stated this patient noticed no lack of tears, but

the palpebral portion of the gland was left intact. Wurdemann says:

"Removal of orbital gland but partially diminishes the lacrimal secretion, tho it is lower than the physiologic normal. Even true weeping occurs from grief or irritant stimulation. Removal of both orbital and palpebral portions, or the palpebral gland alone, gives a dry eye for ten days or so; but soon compensation occurs, enough watery fluids being secreted to fully lubricate the conjunctiva."

The writer removed the papebral portion of the gland alone in three cases, where epiphora persisted after extirpation of the sac, Meller technic, and altho epiphora ceased no dryness was noted.

The following references to tuberculosis and syphilis of the lacrimal gland have been found, tho it is not claimed to be a complete bibliography, Thos. R. Pooley, and Bennett S. Beach[2] report one case which they diagnosed preoperative as sarcoma. The pathologist reported "numerous small miliary tubercles with a few scattered giant cells. The tissue was in small pieces."

W. D. Hall[3] reviews at some length Fortunati's report,[4] of one case of tuberculosis of the lacrimal gland, no T. B. He quotes Fortunati as stating that he was able to collect 13 reports of cases similar to his own, but we have not been able to find the article to see if he gave references to these 13 other cases.

Lapersonne[5] reported one case which was diagnosed macroscopically adenosarcoma. Microscopically Prof. Herman found probably tuberculosis.

Würdemann[1] reports a case of bilateral tuberculosis of lacrimal gland. However, this patient had had syphilis four years previously with no treatment for a year. Dr. Arnold Knapp (personal communication) very distinctively remembers a case of tumor of the lacrimal gland which his father removed, which was regarded to be a sarcoma, but proved on examination to be syphilitic. He has furnished additional references, the last three, to syphilitic involvement of the lacrimal gland.

Warthen[6] found in literature 132 tumors of the lacrimal gland excluding abcess and tuberculosis.

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LOCATION OF TREPHINE OPENING IN GLAUCOMA SUBSEQUENT TO CATARACT OPERATION

RALPH I. LLOYD, M. D., F. A. C. S.

BROOKLYN, NEW YORK

This is the report of a case of preliminary iridectomy, Smith-Fisher intracapsular extraction, glaucoma, posterior sclerotomy, corneo-scleral trephine (above), trephine (below), and iridotomy, with some discussion of questions arising in connection with it.

A. K., aged 70, came to the office because of poor vision in the right eye. He had a well advanced cataract on this side which permitted the recognition of light and dark. The vision of the left eye was 10/200 but was improved to 15/30 with a couple of letters in the line next lower, if +2.50 s. ⊃ +1. cyl. axis 30° was used. With appropriate presbyopic correction, he was able to read No. 2 with some difficulty. As the left eye was not badly affected, a correcting glass was prescribed with instructions to report from time to time, that he might be kept under observation.

Two and a half years later, the left eye had lost vision and changes in the lens were clearly perceptible. He now could read two letters of 15/50 with correction. Six weeks later a preliminary iridectomy was performed on the right eye with perfect result as far as the eye was concerned. There was no inflammation or trouble with the eye, but the patient was hurried home on the third day to avert an impending mental collapse which was not understood at the time but which later became plain. Three months later, the lens was successfully extracted in the capsule according to the Smith-Fisher technic. The eye was dressed for the first time on the fifth day when it was seen that the anterior chamber had not formed but two days later this was reestablished. There was moderate pain and a little redness of the eye from the twelfth to the sixteenth day, at which time the drop patch was used for two days only; because a small pouting of the wound appeared above.

A pressure bandage was applied and not removed for three days. This was removed for inspection of the eye on the twenty-first day, and elevated tension recognized in spite of the bulging wound. Miotics were used, local moist heat and a pressure bandage, and on the thirtieth day, the patient was allowed to go home for a holiday because the wound had flattened nicely; but the tension was still plus to examining fingers.

There were no illusions that the patient was well, and when he returned at the end of forty-eight hours, the bulging was more pronounced than ever, in spite of continual application of the pressure bandage while away. At one time there were three small bulging spots along the incision, the center one having a bead of vitreous protruding at the top. The tension was taken and found to be 45 mm. by the Schiötz tonometer. The cornea was pushed forward along axis 90°, and apparently retracted laterally, thus giving a corneal surface quite different from that for which any tonometer was planned. We think the eye was harder than 45 mm. in spite of the bulging wound with the small bead of vitreous like a jewel in a setting. Theoretically it is difficult to conceive of much elevation of tension with a bulging wound and a presenting bead; but in these cases the vitreous is pushed or tipped forward at the top along the line of least resistance and probably blocks the anterior chamber above; and it may even block the wound as far as the aqueous is concerned, the bulging being possible thru the iridectomy wound in the iris. This seemed to be the state of affairs in this case. Miotics were used in this case at different times but seemed to have no effect, as would be expected.

At the end of the fifth week of ups and downs, after a sudden severe pain; the wound was found once more to have flattened down and everything looked well except some distension of the veins leading from the ciliary region and the tension to the fingers and tonometer still

up. A posterior sclerotomy was done without any effect upon the tension. This is difficult to explain as a temporary effect was expected with some confidence. One week later, the wound was again bulging with the bead of vitreous tipping the single protrusion located in the middle of the incision above.

A corneo-scleral trephining was done without disturbing the vitreous bead. The site selected was above, over the opening of the original iridectomy. Some difficulty was experienced because of effects of two operations done previously upon the conjunctiva and periphery of cornea. It was not easy to get the corneal layers to separate so as to locate the trephine opening as far forward as was desired but we proved our entrance into the anterior chamber by entering a spatula. The escape of aqueous was not free. There was no reaction of any kind; but five days later, the tension was 45 mm. again according to the Schiötz instrument. There was no immediate return of the bulging but the vitreous was still tipped forward above, and the pupil was gradually climbing upward. The miotics had originally acted in a peculiar manner; the lower half of the iris would contract to the limit but the upper part did not respond, resulting in a pupil located altogether above the center.

On the fifty-sixth day, another corneo-scleral trephining was done below and success was immediate. The iris was drawn taut and the pupil above the level of the edge of the lid in ordinary use. It was not easy to do an iridotomy and an iridectomy was impossible. The aqueous escaped freely, the tension fell and never came above normal limits again. There was no reaction and the wound flattened down promptly. By raising the upper lid high enough to expose the displaced pupil, the patient could see objects.

Time was allowed for the eye to adjust itself, and soon the displaced vitreous had gone back into place. Thru a keratome incision two parallel incisions were made in the iris, resulting in a very good pupil located where nature arranged for it to be. The tongue of tissue between the incisions retracts and is out of the way. With a $+10.\frown+1$ cy. axis 180°, he can read 15/30; and with the usual allowance for near can read No. 1, with difficulty. His tension is now 23.5 mm. for the right and 22 to 23.5 for the left eye, taken on the Schiötz instrument.

Some time after the glaucoma was recognized, it was found that a moderate allowance of whiskey transformed our patient from a nervous and complaining creature into a happy man. We also learned that it was his habit to cry himself to sleep, it being not unusual for him to cry for an hour or two at a time. He also says that he struck his eye against an object about the fifth or sixth day. Two most important factors in the development of glaucoma are evident.

Glaucoma after cataract does not offer much hope as a rule and iridectomy is recommended. As a preliminary iridectomy had been performed, it did not seem likely to offer much, in this case; so the trephine was given the preference. The location of the opening above was certainly not wise, and blocking of it and the anterior chamber angle by vitreous was evident. The happy result is offered because we were not able to find much help in the literature when we were considering the situation. The point of choice of location has not come to our attention before, altho someone has likely found out that it certainly is wise to take the bulging vitreous into consideration, when the decision is to be made as to the place where one shall trephine.

The vitreous even if it presents in small quantity, as it did in this case, evidently does not relieve pressure to any extent and it is probable that in the future, cases which have been classed as delayed union and cystoid wound may find their way into the glaucoma group. We are naturally rather conservative about taking tension with either fingers or an instrument very soon after a cataract operation, but it seems that glaucoma either sets in or recurs more often than we think. There are many cases in which glaucoma simplex seems to have existed without signs; certainly with the disc obscured, we are at a disadvantage; and it is not possible to make a correct diagnosis if the patient comes for operation late after the lens is generally blurred. These are the cases in

which it is easy to upset the equilibrium of secretion and excretion by an operation, even an iridectomy.

In spite of the fact, that the vitreous may block up the excretory angle to the aqueous, the bulging of the wound must have been a safety valve to a certain extent in this case. The ophthalmoscope, now shows no cupping of the disc, a moderate displacement inward of the retinal vessels and a slight general haze.

Most of the effects of alcohol or of its withdrawal, come to be well known to anyone who has spent hours caring for alcoholics in general hospitals located in large cities. In fact, most of us are in the habit of sizing up the patient who is to be operated for evidences of alcoholic habit, in order to avoid the unpleasant results which occur after sudden cessation of its use. The peculiar "melancholy" which affected this patient is the first of its kind to come to my attention.

It would seem that the case reported suggests the efficacy of the Elliot operation in glaucoma after cataract; that the trephining should be made, if there has been an iridectomy, at some place where the iris can hold back the vitreous which is thrust forward; that the pressure may go quite high, even if the vitreous is protruding somewhat and the wound pouting in one or more places. Finally, it would seem from this and other recent experiences that an elevated tension is not infrequently the real cause of delayed union.

STRABISMUS.

FRANCIS VALK, M. D.; Sc. D.

NEW YORK CITY

This paper urges that operation may properly be considered in connection with every case of strabismus, and that apparent cure by other means may only be conversion of heterotropia into heterophoria.

In the issue of the AMERICAN JOURNAL OF OPHTHALMOLOGY, September, 1918, at page 667, Dr. Clarence Loeb of Chicago has honored me by quoting several portions of my paper on Strabismus, read at the meeting of the Academy of Ophthalmology in Boston, 1914. He states that "the author's style is somewhat involved and difficult to follow," and this must be true for he seems to have omitted or failed to notice that my principal thesis was to advance the muscular theory of strabismus *per se* and that the advisability of "operating in all cases" was brought forward only as a *suggestion.* Whereas I still hold that an operation may be indicated; my paper, while admitting that many cases of strabismus are corrected, as far as the cosmetic results require, without any operation, nevertheless the question arises as to whether or not these cases are cured.

One boy with a hyperopia of 3 D. and certain symptoms of asthenopia will be given glasses that correct the refractive condition, and the case is cured as far as our present knowledge permits. But in the case of another boy who has the same refractive condition and also a convergent squint, tho we put on the glasses and the squint seems to be corrected, can it be stated with certainty that the case is cured? Do we not realize that the primal cause of the squint remains? Is not the deficient outward rotation still the same? Should anything more be done when we have simply changed a case of esotropia to one of esophoria?

Considering the same argument, are not many cases of esophoria now corrected and cured by a "suitable operation," notably that of shortening the weak muscle; an operation that today has met with such decided success and approval that we have fully twelve different methods of producing the same result? If we are justified in an operation for esophoria, it may be indicated in all cases of squint, not only to correct a deformity but to cure it.

I do not hesitate to employ the methods

of atropin, glasses, etc., advocated so strongly by Dr. Loeb; and if the squint is corrected, I must be satisfied and continue to change the glasses every few years. But if I am asked my opinion from a purely scientific point I would still advise an operation.

To return to the argument of Dr. Loeb's paper, it seems to me that he must have based his conclusions on the old method of tenotomy of the interni in convergent squint. On that proposition I am fully in accord with him, that no operation should be advised until all other possible means have been tried; but ophthalmology has not been standing still during the past two or three decades; so it seems to me that a tenotomy for the correction of the squint would, at present, be a very archaic suggestion, and perhaps it would be best to incur the "possibility of losing the patient." On the other hand, if we tell the parents that the operation proposed will make the child's eyes much stronger and better able to stand the strain of future studies, though he will need the glasses just the same, then that advice is fully justifiable, and I find very few who will seriously object to that procedure. Furthermore, Dr. Loeb tells us that my paper was the motive for an investigation of those of his past cases in which glasses were used. He found twenty-seven with a little more than one-third correct, that is to say, good fixation and the correction of the squint; but only twenty-seven responded, and is it not fair to conclude that those who did not answer his questions were all failures?

The use of atropin and glasses with the benefits they produce in cases of strabismus has been advanced repeatedly since the publication of Donders' antithesis. I do not think, however, we should limit our work to that thesis of fifty years ago, but we should endeavor to find some method that will produce results better and more permanent than those that were given to us by the eminent teachers of ophthalmology of that age.

Dr. Loeb's presentation of his conception of the advice for the correction of squint is certainly very academic and possibly practical, but is it scientific? In other words, if our investigation and experience lead us to certain conclusions, shall we present and advise them to our patients or to their parents, fully stating our reasons for so doing; or shall we temporize with the case, when in our opinion an operation should be performed for the future benefit of the patients, and when, moreover, we can state that to our knowledge an operation rarely, if ever, results in divergence.

We do have the two procedures to select from, namely, glasses or operation, but I do not consider that by employing one or the other indiscriminately we can "accomplish the same end equally well." The simpler one is not always to be preferred, and I do believe that all operations for simple squint should be invariably successful.

I have no doubt that Dr. Loeb has many cases of convergent strabismus that were corrected by glasses, but he must have operated on many others. Then why did he operate? Was it simply because all other methods failed? At the present time, I am trying to follow out this procedure in all my cases of convergent squint. Until a child is five years old, I tell the parents to let his eyes alone. They will not get any worse, nor will the amblyopia increase. When the child reaches that age, I carefully examine the refraction by all the objective methods and follow with an examination of the motility or rotation of the eyes with the tropometer. If this shows a decided deficiency of outward rotation in both eyes of less than 40, I do not think glasses will be of any service, though to counteract the "possibility of losing the patient," I may try atropin and glasses. This failing in a reasonable time, a month or two, we must and should advise an operation. On the other hand, if we find a fairly good outward rotation in the non-squinting eye, then I think glasses will produce a very grateful result in the correction of the squint. But, in adopting this method, as I said before, I have simply changed a case of esotropia into one of esophoria, in which many of our writers recommend an operation.

To illustrate my work, I will record a few cases.

No. 4501. J. S., age 9—C. C. S.—Periodic L. E. turns in, good fixation at

times. R. E—20/15. L. E.—20/100. Hy +5, with Ah. Rotation R. 45° in 45° out. L. E. 55 in 30 out. Advice: operation and shortening L. ext. Result: lost the patient.

No. 4956. Miss A. K., age 5—C. C. S. 2nd class. V—20/20 each eye. Hm. +2 D.—Rotation R. 50° in 30° out. L. E. 60° in 25° out. Atropin and glasses do not correct. Advice: operation shortening both externi at once. Result: lost the patient.

No. 4636. Miss C. S., age 6—C. C. S. onset at second year. V 20/20 each eye, wearing glasses, partially correcting squint but with constant headache when reading. In this case I at once advised an operation on both eyes, shortening the externi and declined to try any further use of glasses, as rotation shows 60° in, 40° out. Each eye. Result: lost the patient.

No. 7120. J. B., age 7—C.C.S. 2d class. V. = 20/15 in each eye. Hm.+2.50. Rotation, R. E. 60° in. 40° out. L. E. 60° in. 35° out. Operation shortening both externi. Result: perfectly good fixation and binocular vision.

Can we have any better illustration than this of the need of an operation?

No. 7499. Mrs. D. J. W., glasses +1. D. by others. No comfort. History of C. C. S. for some years when a child. (This illustrates the old saying that squint may correct itself; but does it?) Has constant strain when using the eyes and worse when looking at motion pictures. V=20/15— each. Refraction Hy with Ah. 180° Rotation R. 45° in and out. L. E. 55° in, 40° out. This is almost a case of dextrophoria, as the R. E. tends outward. She now has no squint but I think an operation shortening on the left eye will help her and should have been done when a child.

No. 5026. J. S., age 23, C. C. S. 2nd class. Wearing glasses fails to correct. V. = 20/20 each. Refraction H. and Ah. rotation R. 60° in 40° out. L. E. —50° 30° out. Advice: operation. Result: lost the patient.

These are cases in which I felt it essential that they should have an operation, and declined to consider any other procedure, as my results in many other cases have given me much satisfaction.

No. 7426. Miss L. B. Operations on the ocular muscles by three oculists. Probably tenotomy and advancement L. E. Result: cosmetically fairly good the R. E. turning in with pain in both eyes and cannot focus. V=20/15 each eye. Refraction H. and Ah. Rotation R. E. 50°—40° out, L. E. 40° in, 50° out. From this examination one may fairly conclude that this was originally a case of C. C. S. 2nd class. If this is correct, a free shortening of both externi would have produced a much better result and not a bad case of sinistrophoria.

Now I have no objection to Dr. Loeb's assertion that he "absolutely disagrees with Dr. Valk that an operation should be done in every case," that is the doctor's personal opinion. But I do not think Dr. Loeb will find any words in my paper that present that proposition as my unqualified view. I advanced the theory simply as a suggestion, trusting it might produce a full discussion without a flat denial, and the present article is written with the same purpose in mind.

May I conclude by thanking Dr. Loeb for his reference to Hereditary Squint? This is very interesting to me, tho I regret that he did not explain in his paper just what conditions were inherited in the cases of the children he cites as illustration. That is to say, did they inherit strabismus per se or the hyperopia or the unbalance of the ocular muscles? If the last was the case, then an operation, though not absolutely necessary, may be indicated.

Finally, consider well the rotation of the eye in all cases of squint, as advised by Dr. Howe of Buffalo, and if you have a decided want of outward rotation in convergent strabismus, a shortening operation is indicated on one or both externi, with full confidence of a successful result.

NOTES, CASES AND INSTRUMENTS

A NEW METHOD OF SUTURING IN THE ADVANCEMENT OPERATION FOR STRABISMUS.

J. G. HUIZINGA, M.D.

GRAND RAPIDS MICHIGAN.

The suturing of any one of the delicate little muscles of the eye to the eyeball in the advancement operation has been much discussed, and many methods have been proposed. But none of them seem to have received sufficient support from the profession to warrant its general acceptance and thus standardize the technic. Under these conditions it may seem somewhat presumptuous to offer any new method, yet because of its simplicity and the ease with which it can be accomplished together with its positive holding power preventing the thread from tearing its way out through the muscle, we are constrained to submit the following:

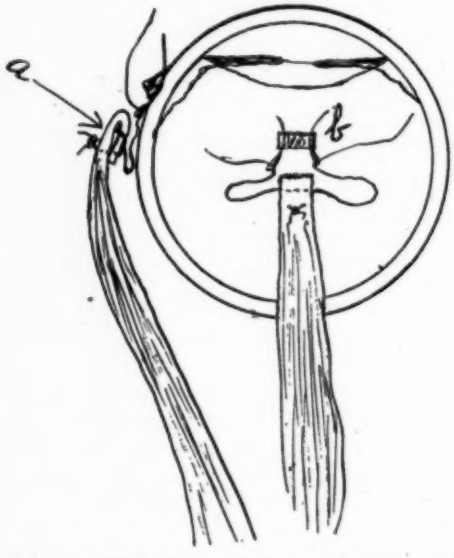

Fig. 1. *a.* Shows loop made by tendon and sutured in shape. *b.* Advancement suture passing through tendon loop and needles in stump of tendon. (Huizinga).

The tendon of the muscle which it is desired to advance is cut at right angles as close to its insertion into the eyeball as possible. The muscle is grasped with any advancement forceps, to prevent it from slipping back and to assist in drawing it forward, etc. The end of the severed tendon is folded back upon itself *beneath* the muscle and held in position by passing a suture thru the tendon and muscle, thus forming the end into a loop. A doubled needled thread is passed thru this loop. These needles and thread are then passed thru the stump of the tendon, still inserted into the eyeball, and partly thru the sclera in the usual way. The tying of this last suture and the advancing of the muscle is accomplished as in other operations and they are left in place for the usual length of time. (See Fig. 1.)

We claim for this operation that the sutures positively cannot pull out or cut their way through the muscle; and if they are properly placed and tied to the stump and sclera, the result obtained must be perfect.

THE REFRACTION IN KERATOCONUS.

DR. JOSÉ DE JESUS GONZALES.

LEON, MEXICO

At the meeting of June, 1902, of the Mexican Ophthalmological Society, Dr. Uribe-Troncoso presented a case of keratoconus with hypermetropic refraction in the periphery of the cornea and pointed out that the authors did not call attention to the possibility of finding this condition in cases of keratoconus. At the same meeting Dr. Ramos spoke of another case that he had seen with Dr. Fernando Lopez, in which vision improved much with a plus cylinder of 3 D., axis 180°.

Wishing to contribute something towards the study of the refraction in this disease, I shall describe an interesting case:

F. Ll. S., a young man 23 years old, born at Zacatecas, strong, well-built, intelligent and educated, came to me because he wanted to go back to his interrupted literary career, and he needed his refraction determined.

Since he was a boy, he noticed that he needed to approximate the book to his

eyes in order to be able to read, but he was able to finish his primary and high school studies and was prepared to start his law studies. Recently his old visual difficulty had increased, and far as well as near vision was greatly decreased, there being no satisfactory glasses to improve his sight. He then consulted Dr. Fernando Lopez, who did some cauterization of the cornea, and afterwards an iridectomy, and then the tattooing of the cornea. There was a family history of hyperopia and astigmatism as well as of keratoconus.

The vision was 1/10 and the vision for colors was normal. With the ophthalmoscope the media were clear, and the fundus normal. The optic disc was deformed because it was seen thru the distorted cornea.

With the skiascope the first thing to be noticed was the presence of a circular shadow surrounding the pupil with a lightened center, which is characteristic of these cases. This ring in its deformation gave proof that there was intense astigmatism present. All the examinations were made in the eye that had not been subjected to the tattooing, but in both it could be made well.

The refraction was as follows: taking the meridians of extreme refraction O. D. in the middle of the dilated pupil—10 D., in the inclined meridian 180°,—8 D. in the 80° axis. O. S. in the conical zone —8 D. in the 180° axis, and —3 D. in the 100° axis.

According to these findings I thought that the vision would be improved with concave spherical glasses associated with concave cylindrical ones; but it was not the case, and vision remained as bad as before, and could improve only with convex cylindrical glasses. After making a new examination, with the patient looking upwards, downwards, inwards, and outwards, I found a very high hyperopia, as follows:

O. D. and O. S. Looking up 9 Diopters.
O. D. and O. S. Looking down 9 Diopters.
O. D. and O. S. Looking in 9 Diopters.
O. D. and O. S. Looking out 9 Diopters.

These findings were surprising to me; more so when in a paper we are writing on the Skiascopic Refraction of the Peripheric Areas of the Cornea in Emmetropic Eyes, I had constantly found a myopic astigmatism, because the shadow moves in the same direction in which the eye has moved, this in a vertical line, while in a horizontal line it moves in the opposite direction, the astigmatism reaching up to 3 D.

We then had a patient with strong myopic astigmatism of the irregular type in the more ectatic zone of the cornea, and with strong hyperopia in the peripheral zones of the cornea.

The best correcting glasses found for this patient have been:

O. D. Sph. —4 D.⌒—8Cyl. Axis 80°.
O. S. Sph. —4 D.⌒—8 Cyl. Axis 180°.

With this prescription vision rises for distance from 1/10 to 4/10; and for near sight it allows the patient to read at 25 centimeter degree 9 of the Didot scale, which is the one considered by Professor True as the smallest type for books for the school.

The keratoconus in our patient *does not seem* to be congenital, because he was able to read for a long time during day and night, and could make many strains without much effort. The diminution in vision was made more patent in his eighteenth year, and he was operated on between 19 and 20.

I believe that this patient was born a strong hyperope, because even after the natural diminution of it with the advancing age, we found 9 D. in the peripheral zone of the cornea. The efforts made during reading gave rise to corneal malnutrition, and the cornea became less resistant, and allowed itself to become distended in the middle, became conical and in that area an irregular astigmatism developed of a myopic character.

SOME EYE COMPLICATIONS IN INFLUENZA.

A. S. Green, M.D., and L. D. Green, M.D.

SAN FRANCISCO, CAL.

While it is very difficult to prove that the eye conditions herewith presented are other than mere coincidences the

evidence would tend to show that directly, or indirectly, influenza had a bearing upon them.

During the two epidemics of influenza in 1918-1919, we saw numerous cases of conjunctival irritation of lesser or severer degree. There were other cases, however, of a more serious nature and we think the following of sufficient importance to justify putting them on record.

CASE I. PSEUDOGLIOMA, METASTATIC OPHTHALMIA. Annie B., age 3. Always well. Was taken ill with influenza November 9, 1918, and three or four days later contracted pneumonia. When she was ill with pneumonia for about a week her left eye suddenly became blind, very painful and inflamed. Was treated by the family physician. Excepting for the left eye, the child made an uneventful recovery from the pneumonia and was brought to us on February 11, 1919, with the following condition:

Right eye, normal. Left eye, vision, light perception lost. There was a slight general scleral injection with a slight flattening of the globe in the horizontal axis. Under the corneal microscope three or four areas of interstitial opacification of the cornea were found about the size of a pin-head. The anterior chamber very shallow, practically obliterated; the iris somewhat atrophied and lighter in color than the right. The pupil was rigid and dilated to six mm. and adherent to anterior surface of lens. Lens: Anterior capsule slightly clouded and projects forward to the anterior plane of the iris. The rest of the lens clear. An opaque greyish mass of exudate is seen on the anterior surface of the vitreous which fills the postlental region, with three or four blood vessels coursing over it. Eyeball is very soft.

CASE II. IRIDO-CYCLITIS. Sam C., aged 5. Needled for congenital cataract on October 17, 1918. Operation uneventful. Was seen at the office about a week afterwards, and the eye was in a satisfactory condition. The child was not again seen until November 8, 1918, as meantime he and the entire family of five or six members were ill with influenza. When he was finally brought to the office the eye was markedly inflamed and painful. Treatment with atropin and salicylates had little or no effect. The eye finally became very soft and shrunken. Light perception lost.

CASE III. ACUTE GLAUCOMA. Miss C., age 33. On October 26, 1918. Patient went to bed with influenza. The sight of both eyes began to fail. Saw colored rings around lights and a few days later the eyes became very painful. Was seen by an ophthalmologist on November 1, 1918. The case was pronounced glaucoma. The ophthalmologist then contracted influenza and the patient was referred to us January 21, 1919. Examination showed marked injection of both eyes, with tension of right eye of 55 and left eye 69. Vision of right eye 20/25 and left eye 20/50. She was treated by us for a few weeks until her doctor resumed his practice, but responded poorly to miotics and an operation was advised. Her doctor reports that he operated successfully on one eye which regained normal vision and tension. The other eye also eventually regained normal tension.

CASE IV. ACUTE GLAUCOMA. Mrs. A. P., age 28. Was referred to us November 30, 1918. Had an attack of influenza three weeks prior. The left eye became inflamed and painful about November 26, 1918. When examined by us on November 30, we found the patient in a hysteric condition from pain. Examination: Marked photophobia. The eye red and cornea steamy. Vision, hand movements 20 inches. Tension, 55. She was placed in a hospital immediately and responded readily to miotics and elimination, and was dismissed from the hospital December 15, 1918, with vision of 20/20. There has been no recurrence.

CASE V. RETINAL LESIONS. Mr. F. K., age 51. Was taken ill with influenza January 14, 1919. Two days afterwards the vision in the right eye failed so that he was unable to distinguish a fire in the grate. Since then his sight has been gradually improving and on February 19, 1919, his vision was 20/40. Upon examination the following condition was found: The disc slightly congested, with margins somewhat blurred. The blood vessels near the disc under a slight haze. Arterial twigs tortuous. A few punctate

hemorrhages scattered between the macular region and the disc. About a dozen yellowish pin-point spots in the macular region.

The patient is positive that prior to his attack of influenza the vision of the right eye was as good as the left, which is normal.

CASE VI. HEMORRHAGE INTO THE VITREOUS. Mr. G. S., age 38. Very robust, denies lues, in good health till December 14, 1918, when he was taken ill with a mild attack of influenza. Three weeks following his attack he awoke one morning to find that he could not see with his right eye. When he consulted us on February 22, 1919, we found the following condition: Vision, right eye: Hand movements two feet. With the ophthalmoscope: A large dark red mass was found floating in the posterior part of the vitreous, shifting its position with the movement of the eyes. The blood vessels could be seen very indistinctly. The disc not discernible.

CASE VII. PARESIS OF ACCOMMODATION. Miss L. B., age 21. Had influenza during January and February, 1919. Referred to us March 1, on account of inability to read, dizziness and headaches. Examination: Skiascopy, both eyes + 1.00 ⌒ + 0.25 ax. 90°. Vision, both eyes + 0.50 ⌒ + 0.25 ax. 90 =6/6. Esophoria 8° for distance, 10° for near. Amplitude of accommodation, right eye 6½ D. Left eye, 6 D. Fundi, normal. No other pathologic conditions found in eyes.

SOCIETY PROCEEDINGS

COLLEGE OF PHYSICIANS OF PHILADELPHIA. SECTION ON OPHTHALMOLOGY.

March 20, 1919.

DR. WILLIAM T. SHOEMAKER, Chairman.

Vernal Catarrh.

DR. CHARLES H. REED exhibited a a male, aged nineteen years, suffering from chronic eye affection for thirteen years. No member of his family or friends have a similar affection.

The palpebral fissure was narrowed and a slight ptosis was present. The palpebral conjunctiva had a milky white tint, with a decided follicular hypertrophy, especially of the upper lids. No cicatricial tissue or bands. The bulbar conjunctiva at the limbus was thickened and spread over four-fifths of the corneal surface of each eye. The color was pale and the tissue had the appearance of a hyperplasia or thickened conjunctiva, with a number of new bloodvessels.

DISCUSSION: Dr. Edward A. Shumway said that he had shown a case of vernal conjunctivitis of the palpebral type before the Section in January, 1918, which had been cured by the application of radium, and had subsequently reported two successes before the Section on Pediatrics of the Pensylvania State Medical Society in September, 1918. The applications had been made by Dr. Pancoast at the University Hospital, large doses, from 35 to 40 mg., being used, at intervals of three or four weeks, according to the ensuing reaction. In one case in which the radium had been left too long in one position, there had been a burn of the conjunctiva, which gradually disappeared. In none of the cases treated had there been an involvement of the bulbar conjunctiva or of the cornea, as in the present instance, but he thought radium might be employed in Dr. Heed's patient, probably in smaller doses, and he advised its trial. He asked Dr. Heed whether a search had been made for eosinophiles in the conjunctival discharge, as their presence would be in favor of vernal catarrh, as against trachoma, to which the condition bore some resemblance in the case shown.

Dr. Zentmayer said the mechanical ptosis and the thickened appearance of the lids, with a somewhat gelatinous infiltration of the conjunctiva of the upper

lid, together with the unusual hyperplasia of the limbus and cornea, suggest that the case may belong to the class of cases reported by May, of New York, of mixed trachoma and vernal conjunctivitis. The case is very similar to one shown before the Section some six to eight years ago by Dr. Posey.

Multiple Dermoids of Eye, With Other Anomalies.

DR. WM. ZENTMAYER showed photographs of a woman, aged thirty-eight years, with symmetric dermoids of the sclerocorneal margin with a dermoid of the cornea of the right eye. The sclerocorneal growths were about the size of a white bean, of chamois color, pultaceous in feeling and presented several cilia projecting from the surface. The corneal tumor was somewhat conical, yellowish-white and projected between the lids. There were well-marked supernumerary auricles on each side of the head and there was a very marked megalastomia. The right eye was converged about 80 degrees. Marked scoliosis placed the heart on the right side of the spinal column.

At the first operation the sclerocorneal dermoids were removed and about ten days later the corneal growth was dissected off. Two weeks later the right external rectus was advanced and the internal rectus tenotomized. Later the supernumerary auricles were removed and the oral fissure was closed to a point to make the mouth symmetric. The obliquity of the mouth could not be corrected.

Retina Supplied Entirely from the Cilliary Circulation.

DR. ZENTMAYER showed a colored woman. In the right eye there was a large cilioretinal artery which emerged at the upper border of the papilla and at 1½ d. d. from the disk bifurcated, one branch going to the temporal fundus, the other to the nasal. A second large one emerged at the lower outer border of the disk and almost immediately divided, both branches supplying the inferior temporal region. A third came out at the lower inner border and bifurcated at 1½ d. d. from the disk. Both branches supplied the inferior nasal fundus. A small cilioretinal vessel came off at the middle of the nasal margin of the disk. All the vessels had the characteristic crook bending back on the surface of the disk before being distributed to the retina.

Cyst of Iris.

J. M., male, aged twenty years. Seen at Wills Hospital February 28, 1919. He comes on account of attacks of blindness in the right eye. The first attack was in June, 1917, while caulking. Vision was reduced to Lt. Per., which lasted a couple of days. Vision recovered completely, but halos have persisted. No pain. Between this time and February, 1919, the interval of attacks was about six months. Since the latter date they are almost constant, there being but slight intermissions. Family history negative. A "spot" had been noticed in the R. E. since early childhood. Vision: R. E., 6/9 pt.; L. E., 6/6 pt. Tension R. E., 30 mm.; L. E.,, 20 mm. Field, R. E., slight irregular contraction, with a re-entering angle below.

R. E. Iris light hazel. Cyst chocolate brown. Mass is 4.5 mm. by 3.5 mm. and fills the angle of the chamber from the outer border of the sphincter to the ciliary border. It is dome-shaped with the convex above. The borders are rounded and cast a shadow on the iris. The surface is smooth except for a slight thickening of its anterior surface near its base.

The larger circle of the iris is greenish gray in temporal segment but is hazel in its nasal half. The anterior chamber is deep; the iris reacts well to light. The fundus is normal.

Under the use of pilocarpin, vision has increased to 6/6 pt. and T. = 22 mm.

The case belongs to the idiopathic type of iris cysts. The pathogenesis is obscure, but they have been explained as arising from a blocking of an iris crypt. Some sort of surgical interference is indicated. Either the surface of the cyst wall may be excised or an iridectomy including the growth should be done. The latter would seem to be the surer operation.

Ocular Motor Palsies as a Sequel to Influenza.

DR. ZENTMAYER related the histories of three cases for the purpose of bringing the subject before the Section.

A. K., aged twenty-eight years, physician. Seventeen days ago taken with slight headache, general muscular weakness and hyperesthesia of the left side of the chest and the right side of the face. Three days later developed diplopia. Two days ago weakness of the right side of the face and nystagmus.

There was paresis of the right external rectus and nystagmoid movement of the eyes, especially marked in looking to the left. Weakness of the entire seventh nerve, the fundus and fields were normal.

W. H., aged thirty-one years, male, stock broker. He was seen in consultation with Dr. Maxwell Langdon. Four days ago he began to feel heavy and drowsy. For this he took fractional doses of calomel. Two days later he found difficulty in focussing. No diplopia. Vision normal. Homonymous diplopia behaved as in paralysis of divergence. L. H. 3 degrees.

The third case was that of a young woman, seen at Wills Hospital, who had a paralysis of the right external rectus.

In all the cases the symptoms were recovered from in short time. In all there had been an attack of influenza which had been apparently recovered from. Lethargy was not present in any of the cases.

Dr. Zentmayer did not think that any of the above cases could be considered as belonging to the type occuring in various parts of the world and to which the term lethargic encephalitis has been given.

DISCUSSION: Dr. Edward A. Shumway said that many of the members present must have been struck by the number of ocular palsies which had been appearing of late, and he reported in some detail six cases, in one of which there had been a history of influenza, but in the other five no such history was obtainable. With the exception of the postinfluenzal case, they had shown marked drowsiness, in some instances stupor. The oculomotor and abducens nerves were the most frequently affected, and in two the facial nerve was involved. In one of the latter the sympathetic fibers were apparently disturbed, as there was narrowing of the palpebral fissures, widening of the pupil and a slight enophthalmos on the paretic side.

One patient had died at the end of two weeks, respiratory failure and high temperature appearing just before death, altho the ocular paralysis had been clearing up. Unfortunately no postmortem examination could be obtained. In three cases there was decided disturbance of speech, the patients talking in a slow, drawling manner. In one instance the Wassermann test was positive, but the suddenness of the onset with fever seemed to warrant the placing of the case in the same class as the others. They must be considered as a polioencephalitis, and apparently closely resembles a case of "lethargic encephalitis," which have been described in epidemic form in England, France, Germany and Austria during the past year. Similar cases have been seen in various parts of this country, notably in New York, Chicago and Baltimore, so that the epidemic is evidently spreading here and more cases are to be expected. Whether they have any relation to the influenza outbreak is as yet unsettled, but we have evidently to deal with an acute, probably infectious process involving the centers in the neighborhood of the corpora quadrigemina and extending downward in some instances into the pons and even into the medulla.

Dr. S. Lewis Ziegler said that the discussion so far had not noted the fact that paralysis of the external muscles of the eye may have a local peripheral origin, such as exposure to cold or a draft striking the eye. This is on a par with cases of Bell's palsy arising from exposure to cold weather when the patient sleeps in the open after a debauch. Three cases of para-

lysis of the external rectus consulted Dr. Ziegler within a few days of each other, each giving the history of sleeping in a draft during a spring night when the weather suddenly changed from a high temperature to a low one. All of these cases yielded to the combined galvanofaradic current, two recovering after one month's treatment and one after three months.

Silver Wire Arteries

Dr. Charles R. Heed exhibited a male, aged fifty years, presenting marked changes of the retinal arteries of the right eye. Physical examination disclosed a chronic pleurisy, emphysema, enlarged heart and a general arteriosclerosis. Blood, Wassermann negative.

Fundus. R.: Disk pale; margins irregular and exudate covering surface; veins were moderately dilated and tortuous; arteries showed sclerotic changes of an advanced state; temporal vessel appeared as a solid white line. The other arteries appeared as chalky white lines with a central blood column. L. Disk margins clear; color pale; retinal vessels show no gross changes.

Discussion.—Dr. Zentmayer said the retinal arteries in Dr. Heed's case were not "silver wire" in the sense in which this term is usually applied, that is, they do not show hyalin thickening but rather a perivasculitis. This in connection with the enlarged veins, the atrophy of the nerve and the connective-tissue formation on the surface of the papilla suggested that the case was one of postneuritic atrophy.

J. Milton Griscom, M. D.,
Clerk.

ROYAL SOCIETY OF MEDICINE.

Section of Ophthalmology.

June 4. Mr. W. T. Holmes Spicer, President.

Relation of Pituitary Body to Carotid.

Mr. J. Herbert Fisher exhibited, by means of the epidiascope, a life-size drawing through the center of the optic chiasma, to show the pedicle of the pituitary body and the intimate relationship between the lateral boundary of the pituitary body and the inner wall and internal carotid artery. This artery, having come forward in the floor of the cavernous sinus, made a bend with its convexity forwards as it ascended to pass on the mesial aspect of the clinoid process on its anterior aspect. It also showed the ophthalmic artery coming off.

Mr. Fisher considered that if there were a swelling of the pituitary body of either a transient or permanent nature, it was very likely to cause an immediate effect on the carotid artery by indenting its inner wall and so interfering with the blood flow, and producing thereby an effect on the cerebral, and possibly also the retinal, circulation.

This section seemed to support the view he recently brought before the members, that possibly an abnormal state of the pituitary body might be responsible for some varieties of migraine, and explain such attendant symptoms as aphasia. Some further support was derived from the fact that during an attack of migraine it was common for the superficial temporal artery to be tense and cord-like. If the enlarged pituitary caused compression as he suggested, then more of the blood brought up the neck by the common carotid must be diverted and fill up the branches of the external carotid, of which the temporal artery is the most easily investigable.

Connective Tissue in Front of Disc.

Mr. L. V. Cargill showed a case of pigmented connective tissue in front of the optic disc of the left eye. When the patient, a soldier, was in France, in 1918, he was struck in the face by shrapnel. As the man was complaining of blindness, his condition was described there as evulsion of the optic nerve. It did not have that appearance, however. The history showed that the man had no vision in that eye before he

was recruited. The disc of the left eye was practically hidden by this mass, which projected beyond the level of the fundus some 3 to 5 diopters. From some of the radiating white streaks, blood vessels could be seen to emerge. He thought it must be due either to some defect of a congenital nature, to trauma, or to inflammatory change. His view was that it was due to a hemorrhage, which might have occurred at birth. Obviously it had no relationship to the facial injury by shrapnel.

Obstruction of Retinal Vessels.

MR. F. A. JULER showed a patient with obstruction of retinal vessels, with patent vessels, following an electric flash. This case of embolism of the central artery of the retina showed some unusual features. The part of the retina on the outer side of the disc looked healthy and was not opaque, and there was a small cilio-retinal vessel supplying this part of the retina. With regard to the nature of the obstruction, the man had an extensive heart lesion, which Dr. Langmead regarded as probably congenital. At this date, a fortnight after the onset, the retinal arteries of this eye had as large a caliber as that of the other eye vessels. The existence of the heart lesion made it difficult to escape the view that the obstruction was due to embolus in the central artery of the retina. The man was engaged in his electrical work, when a flash took place about six feet from him, and two hours later the eye was gradually becoming blind. An hour after that the sight came back almost completely. When, however, he went to sleep shortly afterwards he awoke with the eye again blind. The diminished force of the heart's action during sleep probably enabled the blockage of the artery to again become complete. The question of compensation having arisen, he gave the view that there was a causal connection between the flash and the blindness.

Melanoma of Choroid.

MR. FOSTER MOORE exhibited a case of melanoma of the choroid, which had remained stationary for 5½ years. It showed the characteristic "blue ointment" color, which was uniformly distributed over the growth. It was only discovered on routine ocular examination. The pigment appeared to be intracellular.

Visual Perception of Solid Forms.

MR. E. M. EATON contributed an exhaustive paper, illustrated by many slides, on "Visual Perception of Solid Forms." He showed that the binocular element was the essential factor in stereoscopic vision. The stereoscopic quality was not an exclusive attribute of binocular vision. It must be recognized that as experience increased, sensation came more and more to assume an objective character, and ultimately it became undifferentiable from perception. This was not equally true of any other sense, if indeed it were so at all. In the ordinary view of objects there was no conscious relic of the abstract sense of light; there was merely an impression of the perception of the object seen.

It was possible to so suppress the image of each retina. If two retinal images did not fit each other satisfactorily, it was possible to automatically cut off the projecting portions. In fact, in only a few circumstances did one utilize the whole of both retinal images. When it was said that by means of binocular vision a view could be obtained around objects, it really meant that spaces behind them could be appreciated, as in looking across a sandy desert in sunshine and perceiving the air agitation due to altering states of atmospheric density and therefore refracting power.

DISCUSSION: J. H. Parsons spoke of the great value of the paper, especially in connection with the visual problems of aviation. He said the contribution invited very careful study.

H. Dickinson.

AMERICAN MEDICAL ASSOCIATION.

Section on Ophthalmology.

JUNE 11-13, 1919.

CHAIRMAN, CASSIUS D. WESCOTT OF CHICAGO.

The chairman made a brief address introductory to the business of the meeting.

Ophthalmology and the Physician.

CHARLES P. EMERSON of Indianapolis, read a paper, (published in full, JOURNAL OF THE A. M. A., v. 72, p. 1817), in which he discussed the relief of eyestrain, especially headache, sensitiveness to light and colors, forms of vertigo and dizziness, and other nervous and mental symptoms; and the relief possible thru correction of anomalies of refraction and movements of the eyes. Viewing the subject from the standpoint of the internist, his paper was of a particular value to ophthalmologists.

Refinements in Examination of Refraction.

WALTER L. PYLE, of Philadelphia, presented this paper, (published in full, JOURNAL A. M. A., v. 72, p. 1821), dealing especially with refinements, he regarded as necessary but often neglected, in the examination room and its lighting, test lenses and frames, the necessity for return examinations, test charts—objective methods, which he thought almost indispensable but not to be relied on against careful subjective examination.

Present Status of Refraction Work.

E. J. GARDINER, of Chicago, presented a partly historical sketch from which he drew lessons for younger colleagues (see JOURNAL A. M. A., v. 72, p. 1824).

Muscular Anomalies.

SAMUEL THEOBALD, of Baltimore, regarded the correction of muscular anomalies as secondary in importance only to the correction of the faults of refraction, and he believed they were often overlooked, supporting his contention with statistics and giving methods of diagnosis. (See JOURNAL A. M. A., v. 72, p. 1827.)

Ophthalmic Service in American Expeditionary Forces.

ALLEN GREENWOOD, of Boston, presented briefly the paper, published in full on page 565 of this JOURNAL.

Control of Trachoma.

GEORGE S. DERBY, of Boston, presented his paper on Control of Trachoma among the Alien Labor Companies working in connection with the British and American Expeditionary Forces in France, (published in full, p. 500).

Group Studies in Ophthalmic Research.

The paper on this subject by F. PARK LEWIS, of Buffalo, has appeared in full (JOURNAL OF THE A. M. A., v. 72, p. 1893). It urges that for an understanding of ocular diseases an investigation is necessary of conditions that lie outside of the eye itself; and for this reason, cooperation is necessary with workers specializing in other branches of medicine and general science.

Daylight Illumination of Interiors.

EDWARD JACKSON, of Denver, presented a paper on this subject, to be published in full in this Journal.

Family Degeneration of Macula.

ROBERT BLUE, of Chicago, presented this paper, which will be published in the JOURNAL OF THE A. M. A. It reports the history of a case in which vision began to fail at the age of 12 or 13, and at 18, had fallen to 6/60. A younger sister, aged 10, had normal eyes and vision. The facts regarding nine other families reported in the literature, are given in tabular form.

Action of Radium on Cataract.

MARTIN COHEN and ISSAC LEVIN, of New York City, presented a paper, (to be published, JOURNAL A. M. A.), reporting the results of exposure to radium of 24 cases of incipient senile cataract, from which they conclude: that such application of radium is harmless, and that there is a diminution of opacity under its influence. It causes no difficulties for

subsequent extraction. It is therefore advisable to test its influence on partial cataract.

Immediate Capsulotomy in Cataract Extraction.

A. G. BENNETT, of Buffalo, presented a paper on this subject which will be published in full in this journal.

Hyaloid Membrane Following Cataract Operations.

S. LEWIS ZIEGLER, of Philadelphia, called attention to this condition and reported a case. His paper will be published later.

Autotoxic Factor in Sympathetic Ophthalmia.

ARNOLD KNAPP, of New York, presented a paper, (JOURNAL A. M. A., v. 72, p. 1897), reporting four cases of sympathetic ophthalmia of the type of serous cyclitis, with attendant symptoms suggesting toxic manifestations. Choroidal and macular changes were present in all cases. In three cases an eye was enucleated, and two of these were subjected to examination. The typical sympathetic ophthalmic infiltration was pronounced, especially in the posterior half of the choroid about an inflamed optic nerve. In these cases there was generally a history of improper diet and over eating associated with constipation. The recognized treatment by use of mercury and salicylates, of course, favors elimination of such toxic factors as may be present. Sources of focal infection should also receive careful attention.

Treatment of Symblepharon and Restoration of Orbital Socket.

WILLIAM H. WILDER, of Chicago, presented a paper which will be published in full in this Journal.

Relation of Teeth, Tonsils and Toxemias to Eye Diseases.

G. H. BELL, of New York, presented a paper, (to be published in full in the JOURNAL OF THE A. M. A.), urging the great importance of these causes of ocular disease and the necessity for routine examination for them, and their correction.

Operation for Conical Cornea.

L. WEBSTER FOX, of Philadelphia, presented a paper on this subject which will be published in full in this Journal.

Uveitis.

A. EDWARD DAVIS, of New York, presented a paper with special reference to the etiology and treatment in the malignant types of uveal inflammation, (to be published in full in the JOURNAL A. M. A.). The causes are numerous, but the symptoms are seldom alike in any two cases, and the treatment, aside from local measures, must be directed toward the cause, the discovery of which will bring into play all the ingenuity and skill at the surgeon's command.

Cysticercus of the Vitreous; Cysts of Retina; Anterior Lenticonus.

This paper presented by G. E. DE SCHWEINITZ and MEYER WIENER, of Philadelphia and St. Louis respectively, will be published in the JOURNAL A. M. A. It reported clinical observations on three cases made at the U. S. A. General Hospital, No. 14, Ft. Oglethorpe, Ga. The first of these seems to be the fifth case of intraocular cysticercus published in this country, and one more thoroly studied and discussed than most such cases in the literature.

The second case presented an ophthalmoscopic picture discovered in seeking the cause of defective vision. The cysts were multilocular, one situated in the region of the macula, and a large group of others farther towards the temporal side. The case of lenticonus was also encountered because of the defective vision.

Foreign Bodies Within the Eyeball.

JOHN O. MCREYNOLDS, of Dallas, Texas, presented this paper (to be published JOURNAL A. M. A.) He reported eleven illustrative cases. The three primary questions confronting the surgeon are: What are the location and character of the foreign body? What are the proposed measures of relief; and what will be the probable immediate and remote results? The reported cases are intended to present the different problems to be dealt with.

Treatment of Dacryocystitis by Curettage.

JOHN GREEN, JR. of St. Louis, read a paper on this subject which will be published in full in this Journal.

Treatment of Glaucoma.

JOHN E. WEEKS, of New York City, presented a paper (to be published in full in the JOURNAL A. M. A.), dealing with his personal observations on this subject. He reviewed the principal determining causes of hypertension, the treatment with miotics, and the operations to be considered. His practice when time permitted had been to make a trial with miotics in all cases before advising operation; but experience had convinced him that early operation is desirable. He found neither iridectomy nor the Lagrange operation satisfactory in infantile glaucoma, a trephine opening is inclined to enlarge by stretching, therefore a large trephine should not be employed. For subacute and simple chronic cases, he relies on the Lagrange operation or Elliot trephining. But with idiopathic glaucoma, except in acute cases, we must not expect a high percentage of eyes to retain their vision after a successful operation.

ABSTRACTS

P. Bailliart, The Retinal Venous Circulation. Ann. d'Ocul. 1918, v. 155, p. 453.

The author considers that there are three possibilities in regard to the retinal venous pulsation: (1) The veins do not pulsate spontaneously. This condition was present in 42 per cent of the cases examined. (2) The veins show slight spontaneous movements, synchronous with the pulse rate, etc. This was present in 21 per cent of the cases. (3) A distinct pulsation of the veins is present. This was found in 37 per cent of the cases. This was found either in the portion crossing the disc, or, more frequently, as the vein appears at the bottom of the physiologic excavation. It commences with the ventricular systole and is prolonged after it. Sometimes it appears as a movement of the walls and sometimes as a movement of the whole blood column.

Pressure on the eyeball produces a gradual obliteration of the veins, the end stage being preceded by a breaking up of the blood column into a granular appearance. This was found only in the disc, as the veins on the retina never are decreased in size, however great the pressure. The pulsation of the vein is short and quick. If the vein shows the latter characteristic, it is probably due to impulse transmitted from an underlying artery. Pressure on the eyeball produces either a complete disappearance of the venous pulse before the arterial pulse appears, or it persists and is even increased. There are then two distinct pulsations in the eye, the venous coming first, but the arterial appearing before its completion. This is never found in normal eyes.

The flow of blood in the retinal veins is governed by the *vis a tergo* of the blood as it leaves the capillaries, which decreases as the disc is approached, and the *vis a fronti* due to auricular diastole, which increases towards the disc. During diastole there is a negative pressure in the jugular and contributing vessels, which travels backwards, and during systole there is a positive pressure. The minimum negative is just at the end of the diastole, and the maximum is at the moment of presystole.

The intraocular maximum pressure occurs just when the venous pressure begins to decrease in the larger vessels. If this maximum is greater than the venous pressure where the vein leaves the eyeball, the vein contracts, and if the minimum intraocular pressure is less than the venous pressure at the same place, it dilates. If the intraocular pressure is always greater than the venous, there will be no pulsation of the vein, any increase simply resulting

in decreasing the caliber of the veins. If it is always less, the walls of the vein will retain their maximum caliber, but if the difference is great enough, there will be a pulsation of the blood column, resembling a piston stroke. Pressure on the eyeball in the first of the last two conditions will produce a venous pulse, unless the pressure becomes too great, and in the second, will augment the "piston" pulse, until it becomes greater than the maximal venous pressure, when the pulse will disappear.

From the above facts it would seem that in the majority of cases the intraocular tension is about equal to the venous pressure at the point of exit from the eyeball. That is to say, the latter will vary between 18 and 22 mm. of mercury.

C. L.

Valude, E., Radioscopy and Radiography of Ocular Foreign Bodies. (Annales d' Oculistique, June, 1918, v. 155, p. 261.)

In this article the author describes a case illustrating how even a good radiographer, for general surgery, may overlook a foreign body in the eye; and how the absence of pain or movement upon use of the magnet is no proof that a magnetic foreign body is not present. The great point for this oculist is the location of the foreign body, intra- or extra-ocular, which is of far greater importance than its size. Next, is the question of whether it is magnetic or not.

Radioscopic examination should precede radiographic. If a foreign body is seen, it may be extraorbital, in the lids, in the orbit or extraocular but moving with the eye. The latter requires an exact diagnosis, as most bodies moving with the eye are intraocular. If its movements are the same as that of the cornea, it is in the anterior hemisphere of the eye; if in the opposite direction, it is in the posterior. In those very rare cases when the foreign body is at the exact center of rotation of the eye, it will not move, altho it is intraocular. In this case, unless it is absolutely round and very small, its dimensions change with the movements of the eye.

A negative radioscopic examination does not prove the absence of the foreign body, as it may be very small and obscured by the dark shadows from a bone. Then two radiographs must be taken, one frontal with the face towards the plate, the other lateral, with the suspected side towards the plate. If a careful examination of these show nothing, it may be concluded that no body visible by X-rays is present. If the shadow of a foreign body is seen, in such a position that it is clearly intraorbital, two supplementary plates must be made; some times four; two in a lateral position, one or two in a frontal.

In the lateral position, the head is inclined so that the injured orbit is projected on a plane interior to that of the other side, the normal rays falling at the level of the root of the nose. While the head is immovable, two exposures are made, one with the wounded eye looking up, and the other looking down. These with the others are usually sufficient for diagnosis. But if it is suspected that the body is in an ocular muscle, two frontal exposures must be taken, with the patient looking ahead and inward.

C. L.

J. G. Forbes. Conjunctival Filaria in Man. Lancet, Apr. 19, p. 654.

Forbes reports two cases in which filaria conjunctivae (Addario) were found. In one case the lesion was in the upper part of the left forearm and resembled a lymphatic gland. A thread-like worm was found in the abscess, and upon examination proved to be a male filaria conjunctivae. This is the first case reported in which the male organism was present. In all other cases hitherto reported, the female worm produced the disease.

The author reported a second case with tumor on the right side of the nose, which when opened was found to be a cyst that contained a female filaria conjunctivae of Addario measuring 94 mm. in length.

W. C. F.

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CHOROIDEREMIA.

Absence of the choroid is such a striking condition, and of such important interest in ocular physiology and pathology, that it deserves to be better known. As indicated in Dr. Connor's paper, (p. 553) the literature relating to it is very scanty. Beside the sentence he quotes from de Schweinitz' last edition, no allusion to it has been found in any American textbook.

Among English books, Parsons[1] mentions it in two lines; and the only fairly adequate account is by Collins and Mayou,[2] based on the article by Nettleship. In the Graefe-Saemisch Handbuch, Leber[3] seems to have disposed of the subject by classifying the reported cases as pigmentary degeneration of the retina with extreme atrophy of the choroid. Fuchs, Axenfeld, Roemer and Adam in their books make no allusion to it. It is mentioned in none of the atlases on ophthalmoscopy. Apparently the first colored plate representing the appearances noted is the one published in this number of this journal.

The first case was reported in 1872 by Mauthner.[4] Two years later Koenig[5] reported two cases, one seen in Schirmer's clinic at Greifswald, and the patient's younger brother. In 1892 Cowgill[6] of Paducah, Kentucky, published a case he had seen six years before. Tatham Thompson[7] of Cardiff, Wales, published his case in 1899, and Otto Landman[8] of Toledo, Ohio, reported his case with a discussion of the probable origin of such a condition in 1905. In 1908 Nettleship[9] in his paper on "Retinitis Pigmentosa and Allied Diseases," brought together the reported cases, with two others that seem to be of somewhat different character, scarcely justifying their inclusion in this group.

The patients have all been males. Generally they were young men when they came under observation; but the completely bilateral character of the condition, the clear history of the defective sight from early childhood,

without change, and absence of any especial sickness to which it could be ascribed point unmistakably to its congenital origin. Nettleship describes it under the heading "Congenital Absence of the Choroid." No consanguinity of parents has been reported. One brother of Mauthner's patient was said to have similar defects of vision. A great uncle of Thompson's patient suffered from night blindness. This latter patient and also Koenig's patients had brothers and sisters with apparently normal sight.

Night blindness or lack of retinal adaptation is mentioned by all these authors except Cowgill. All the patients knew their vision was defective, and all showed concentric contraction of the visual fields. With the ophthalmoscope the media were found clear, the choroid absent over most of the fundus, but present in the region of the macula; and the retinal vessels approaching normal. Scattered pigment spots were noticed in different parts of the fundus, tho Thompson's sketch shows but one.

The patch of choroid present, varying in size from 1 to 3 disc diameters, was not peculiarly pigmented, and had always an indefinite border, in contrast to the sharp boundary seen in cases of choroidal coloboma. In some cases the macular patch of choroid was nourished by vessels arising at or near the disc, in others these were not present. Isolated choroidal vessels were sometimes seen in other parts of the fundus, and Landman sketched what he regarded as rudimentary vortex veins.

The physiologic importance of the choroid makes it almost inconceivable that a large part of it should be lacking in an eye possessed of standard vision in good daylight. But this anomaly has now been so well described by so many observers, and their descriptions agree so completely in all important features, that we must regard choroideremia as a well-established, altho very rare, anomaly of the eye. No case has yet been examined postmortem and none have been encountered in the examinations of enucleated eyes that have added so much to our knowledge of the more common anomalies of the anterior portions of the retina and uveal tract.

Every case of this condition should be carefully studied, not only as to visual acuity and fields of vision, but also with reference to retinal adaptation, tension of the eyeball, and departures of the anterior portions of the uveal tract from normal standards; and anomalies of pupil, and accomodation. The life history of every eye so departing from normal structure would be interesting. Its reaction to injury or infection, its liability to vitreous opacity, cataract and other nutritive disorders would be of interest. It is also pertinent to inquire how often any similar anomaly is encountered in the lower animals.

E. J.

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OPHTHALMIC EXAMINATIONS.

In the last five years three important movements have arisen in the profession for the determination and recognition of special competence by examinations open to graduates in medicine. The state examinations for the license to practice were always designed to enforce a certain minimum standard of requirement, falling below which a candidate should not be permitted to practice. These new examinations are intended to ascertain if the candidate has attained a somewhat higher standard of competence.

The examinations referred to are those of the National Board of Medical Examiners, the American College of Surgeons, and the American Board for Ophthalmic Examinations. The first was designed to furnish evidence of fitness for practice that could be accepted by all the government medical services, and state boards of medical examiners, without requiring a separate examination for each service or state. Such evidence is sought mainly by written and practical examinations extending over several days, modeled a good deal on the plan of the "Conjoint Board" examinations of Great Britain, and familiar in American Colleges and Universities.

The American College of Surgeons was largely designed to raise the ethical as well as the educational standard of the surgeons of America; and to effect that purpose, various committees and individuals have been called upon to certify to the professional character of applicants, while their technical training and skill is passed upon largely by means of case reports, the genuineness of which can be verified by reference to hospital records. Before putting this plan into operation the college was formed by invitation of surgeons upon their general reputation and professional standing, and in this way mistakes were made that have been a serious embarrassment to the organization.

The American Board for Ophthalmic Examinations was neither self constituted nor brought into existence by a general invitation to men of supposed good professional standing. Its members were chosen by the three national organizations, the American Ophthalmological Society, the Section on Ophthalmology of the American Medical Association, and the American Academy of Ophthalmology and Oto-Laryngology, by the same methods as these organizations choose their presiding officers. Its purpose is primarily to ascertain who are properly prepared for ophthalmic practice, altho it also recognizes responsibility not to certify the fitness of those guilty of gross professional misconduct. It gives no academic degree and grants no legal right to practice, but its certificate is already coming to be recognized as an evidence of training for ophthalmic practice, on which the medical profession and the public can rely. After next year it will be required for admission to membership in the American Ophthalmological Society and the Academy.

In determining who should be given its certificate the Board decided it should be restricted to those who made formal application, after careful examination of their claims of qualification submitted, and that this examination should be made on broad lines. There is no more searching written examination than the writing of a book, or a series of scientific papers, to be judged by reviewers, rival authors, teachers, students and practitioners. There is no more conclusive form of oral examination than that of lecturing, quizzing students and taking part in the discussions of medical societies. No better practical examination can be devised than conducting a public clinic in the presence of students and colleagues. Where these tests have been passed successfully, and the general verdict of the profession is known, the Board for Ophthalmic Examinations has accepted the verdict, and on the examination of such evidence has granted its certificate.

But there are many well educated ophthalmologists who have never submitted themselves to the public examinations above referred to, whose

fitness for ophthalmic practice is just as important to the public and the medical profession as that of the writers and chiefs of clinics. It is especially to ascertain and certify their fitness that the Board was instituted. To accomplish this the plan of case reports has been adopted. The man who can thoroly examine a case and reach a correct diagnosis, can make a record of what he finds and the conclusions he draws therefrom; and such a record will enable any skilled ophthalmologist to draw fairly safe conclusions with regard to the professional abilities of its author, especially when supplemented by the examinations which bring the candidate in personal touch with the examiners.

These additional examinations by the Board are oral, practical and written. The oral and practical are largely simultaneous. In the laboratory the candidate examines the prepared slides and tells what he sees in them, the significance of the appearances found, and what conclusions he draws from his observations. In the clinical portion he examines the patient, tells what symptoms he discovers, and is crossquestioned as to his methods of examination, and the diagnosis and treatment that can be based upon the facts brought out. The written part of the examination is planned to develop the basis of fundamental knowledge that the applicant brings to his practical study of cases, that will enable him to get a broad comprehensive view of the conditions presented.

The questions for the last written examination of the American Board for Ophthalmic Examinations were as follows:

1. Describe the development of the crytalline lens.
2. Draw a diagram of a vertical crosssection of the middle of the upper lid, indicating the structures and their relations.
3. What change takes place in the iris in the act of accommodation; what effect does it have on vision?
4. Describe the repair of corneal tissue after its destruction by corneal ulcer.
5. A patient with uveitis develops increased tension of the eyeball, with severe pain and loss of vision. How would you manage the case?

It is natural on reading of such examinations to inquire how one would answer such questions himself. Generally there is a feeling that the fundamental branches studied long ago have been forgotten, and would prove the chief stumbling block. But the danger of this has been duly considered by the Board and failures to pass these examinations have not usually been on account of lack of training in physiologic optics, or anatomy, or inability to recognize a section of sarcoma of the choroid, or inflamed cornea. They have been more commonly due to inability to take a field of vision by any one standard method, or to recognize disease with the ophthalmoscope; or to the knowing of but a single routine method of measuring the refraction of an eye, or to incomplete mastery of even that. They have been due to weak points in the *practical* training for ophthalmic practice.

Sometimes the applicant would be well trained in most directions, but utterly incompetent to use a certain necessary method for diagnosis, or to manage a certain class of cases. When he was made aware of this, and set himself to make good the defects of his earlier training, he became a better ophthalmologist, a safer adviser for his patients, a more worthy and more successful member of his profession.

The drawing of the distinction between the ophthalmologists of America who are fairly prepared for their work, and those who are not, is a proper function of the Board of Ophthalmic Examinations. But a far more important work will be accomplished by arousing all ophthalmologists to compare their own training with a standard or an ideal course; and by stimulating them to discover in what they are deficient, and to seek the remedy for their deficiencies.

There are reasons and need for enormous improvement in the graduate teaching of Ophthalmology in this country. Paris and London are taking important steps to increase the effi-

ciency of such teaching; and to draw to themselves students who cross the seas. But in certain important respects American methods of opthalmic practice are better than those current in Europe. The opportunities and quality of teaching should be equally good here. here.

The mass of those who treat the eyes of Americans will be trained in America. They must be as well trained as the mass of ophthalmologists in the old world. As our profession comes to understand what a good school of ophthalmology is, and the need for it, and proceeds to make its influence felt on the laity, the schools we need will be forthcoming. The American Board for Ophthalmic Examinations is one means for making our needs felt.

As was pointed out in the reports made by its members of the Board to the Section on Ophthalmology of the A. M. A., after next year the American Ophthalmological Society and the American Academy of Ophthalmology and Oto-Laryngology will require the certificate of the Board for admission to membership. It is also proposed next year to cease awarding the certificate on any examination that does not at least include the submission of case reports.

In the beginning there were older members of the profession whose published records were a sufficient basis for deciding their fitness for the certificate. Now, and in the next year, these will have had their opportunity to apply for such recognition. It is fair to suppose that if they have not done so, in the first five years of this effort on the part of ophthalmologists to raise their standard of training, that they do not care to lend their names to assist in the movement, or to ally themselves with the body that will be more and more the regular ophthalmic profession of the future. It seems proper, therefore, at this time to establish the single gateway of admission to such recognition.

Prompt application for examination will give material assistance to the new movement, and still give applicants the benefit, if benefit it be, of having their past work recognized in the examination. But all who are awake to the changes going on about them must recognize that this is a period of transition; and in the future, men will be more thoroly and systematically trained for ophthalmic practice; and the general profession and the public will be more exacting with regard to evidences of good training.

E. J.

THE OSLER ANNIVERSARY.

On July 12th of this year occurred the seventieth anniversary of the birth of Sir William Osler. With cordial enthusiasm members of the English speaking medical profession united to do him honor in a memorial volume that developed so that it had to be divided. The original papers announced to appear therein number 139, representing every department of medicine.

Sir William has not been especially connected with the field of ophthalmology. But his service in the Royal London Ophthalmic Hospital placed him in the class with Albutt, Hughlings Jackson, Jonathan Hutchinson and Sir Wm. Gowers, of those whose acquaintance with the exactness of methods of ophthalmic diagnosis has contributed to their eminence in other fields of medicine and surgery.

In view of Osler's catholic interest in all that pertains to medical science, it is appropriate that the memorial volume should contain papers relating to ophthalmology. There are five of these all by American writers, as follows:

Oxycephaly and Exophthalmos, by George Dock, of St. Louis, an internist.

The Schematic Drawing of the Eye in Its Historic Development, by the late Mortimer Frank, of Chicago.

Visual Disturbances of Polycythemia Vera, by Harry Friedenwald of Baltimore.

Description of Minute Sarcoma, with Histologic Findings, by John E. Weeks, of New York.

Eyes of the Burrowing Owl, Special

Reference to the Fundus Oculi, by Casey A. Wood, of Chicago.

Chronic Tuberculosis of the Choroid, by Edward Jackson, of Denver.

From his colleagues and admirers among American ophthalmologists, we offer sincere congratulations and good wishes; with the hope that he will live up to his centenarian family history; and long continue the active, progressive, wise leader that he is to the medical profession.

E. J.

BOOK NOTICES.

Squibbs Materia Medica. 1919 Edition. Published by E. R. Squibb & Sons, New York (gratuitous).

This is an exhaustive series of formulas and descriptions of the products gotten out by this well-known pharmaceutical house. The occasion of its publication is the one-hundredth birthday anniversary of the late Dr. E. R. Squibb, the founder of the house; and the sixtieth anniversary of its foundation. This little book is useful for reference; more so perhaps to the ophthalmologist than to some of his professional colleagues, who are habitually prescribing a wide range of drugs for internal use.

H. V. W.

The Refraction of the Eye. A Manual for Students. By **Gustavus Hartridge,** F. R. C. S. Sixteenth Edition. (See also p. 546.)

The fact that this little book has run sixteen editions from the time of its first publication in 1884, bespeaks its popularity and something of its value. The size of the book has remained about the same, the present edition being 281 pages, including the index. The author has, from time to time, condensed portions and included newer methods.

In this last edition will be found the broken ring test chart of Landolt; newer references to the shadow test, which the English call Retinoscopy and brief notes on heterophoria, which, with its subdivisions, now seems to be accepted by our English cousins as a proper nomenclature. We note that "cyclophoria is only occasionally met with in this country, tho cases seem frequently to occur in America." Also that asthenopia is sometimes due to diseased teeth. In other respects this edition is like the previous ones, discussing the subject of refraction in a personal way that makes easy reading for the student.

For the sixteenth time we recommend this book for teaching purposes and as a vade mecum for the refractionist.

H. V. W.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C. Volunteers are needed in other localities.

DEATHS.

Dr. F. K. Brown died in Philadelphia on May 31st.

Dr. C. B. Bush died in Philadelphia on May 27th.

Walter T. Clegg, of Liverpool, died suddenly of pneumonia, at the age of sixty years.

L. E. Desjardins, a professor in Laval Medical College, Montreal, died recently.

Dr. William M. Floyd, of Henderson, Kentucky, died on May 17th.

Dr. Hiram L. Lutz, of Philadelphia, died on June 8th.

Erik Nordenson, of Stockholm, died last February of influenza in his 72nd year.

Arthur Brigham Norton, New York City, for ten years the editor of the Homeopathic Eye, Ear and Throat Journal; died at his home, June 18th, from pneumonia.

Henry Simon Oppenheimer, New York City, aged 75; a member of the American Ophthalmological Society; Ophthalmologist to the Montefiore Home; died at his home, July 5th.

H. E. Pagenstecher, of Strassburg, died recently.

Dr. L. M. Palmer died in Boston on June 4th.

H. Schöler, of Berlin, died recently.

Dr. H. F. Stowell, of Rochester, New York, aged 71, died at his home on June 8th, from senile debility.

Henry G. S. Warren died recently in Sydney, Australia.

The friends of Dr. A. E. Bulson in the medical profession extend to him their deep sympathy and regret at the death of his wife, Eva Maud Bulson. Mrs. Bulson died of heart disease in their home at Fort Wayne, Indiana, on June 25, 1919.

PERSONALS.

Dr. Chas. A. Bahn has been elected assistant professor of Diseases of the Eye in the Graduate School of Medicine, Tulane University; and first assistant surgeon in the Eye Department of the Eye, Ear, Nose and Throat Hospital of New Orleans.

Charles H. Baker, of Bay City, was elected president of the Michigan State Medical Society at its 54th annual meeting.

At the annual meeting of the Southwest Kentucky Medical Association held at Paducah, Kentucky, May 22nd, Dr. H. G. Reynolds was elected president for the ensuing year.

Acting Assistant Surgeon F. B. Eaton, U. S. Public Health Service, has been ordered to proceed from San Francisco, California, to Lexington, Kentucky, and to continue his investigations as to the etiology of trachoma in Kentucky and the Appalachian region.

Dr. A. C. Bartholomew announces his return to civil practice, with offices in the Home Guards Temple, Van Wert, Ohio.

Dr. E. A. Codman announces that he has returned to civil practice at 227 Beacon Street, Boston.

Dr. Arthur M. Yudkin, announces that he will be located at 238 York Street, New Haven, Connecticut, for the exclusive practice of the diseases of the eye, ear, nose and throat.

Dr. Harry Vanderbilt Würdemann, recently released from Army Service, and Dr. Harry Francis Macbeth will be associated in practice after June 1, 1919, at 708-710 Cobb Building, Seattle.

Dr. Samuel D. Risley of Philadelphia expects to spend the month of August at Bear Lake, Luzerne County, Pennsylvania.

Dr. T. B. Holloway, secretary of the American Ophthalmological Society, has been elected Surgeon to Wills Eye Hospital, Philadelphia, to succeed Dr. Wm. M. Sweet, who recently resigned. Dr. Sweet will continue his present work as Assistant Surgeon to Jefferson Medical College, Philadelphia. Dr. Holloway expects to leave the city about August 1st for a trip to Canada.

Colonel Casey A. Wood has been engaged during the summer on his Encyclopedia of Ophthalmology and the Anniversary Volume in honor of Sir William Osler and expects shortly to take up the preparation of the Base Hospital Section of our Medical and Surgical History of the War. He will remain in California until October 1st after which he will return to Washington for the purpose just mentioned.

Dr. A. C. Seely of Roseburg, Oregon, has returned from the Service and resumed his practice.

Dr. Calvin C. Rush of Christian College, Canton, China, is now located at Mountain View, California.

Dr. Robert I. Bullard of Springfield, Illinois, has recently returned from overseas service.

Captain E. C. Spitze has been discharged from the Army service and has resumed his practice in the Murphy Building, East St. Louis, Illinois.

Dr. Ralph T. Merrill has received his discharge from the Army and has opened his office in Idaho Falls, Idaho.

Dr. James A. Morgan is relieved from active duty in the Naval Medical Corps at the U. S. Naval Hospital, Mare Island, California, and is resuming his practice at Honolulu.

Dr. Harry V. Würdemann of Seattle has been commissioned Major M. R. C. He recently served as chief of the Eye, Ear, Nose and Throat Section, Base Hospital, Camp Lewis, Washington.

Dr. Vard H. Hulen of San Francisco, California, has received his discharge from the Army and has returned from France. We had the pleasure of seeing Dr. Hulen in Denver on his way home. He was looking very fit after his military experience.

Dr. G. I. Hogue has returned after a two years service with the A. E. F., and will resume his practice at 410 Jefferson St., Milwaukee.

SOCIETIES.

In the meeting 3rd of May, 1919, of the Norwegian Society of Science in Christiania the Fridtjof Nansen Prize—Kr. 2000—was awarded to Hj. Schiötz and S. Holth for important work on glaucoma.

The Tenth Annual Meeting of the Oxford Ophthalmological Congress took place July 11, 1919, with the following officers: Sidney Stephenson, master; Philip H. Adams, deputy master; Sir Anderson Critchett, honorary treasurer; A. Bernard Cridland, honorary secretary.

At the annual meeting of the Kansas City Eye, Ear, Nose and Throat Club the following officers were elected: President, Dr. Hal

Foster, Kansas City; vice-presidents, Drs. John D. Pifer, Joplin, and Theodore S. Blakesley, Kansas City.

At the recent meeting of the American Medical Association, Section on Ophthalmology, the following special committee was appointed to cooperate with committees from other societies for the purpose of considering the advisability of arranging for the International Congress of Ophthalmology to be held in the United States. It was recommended that these committees be appointed: A committee of three to report to the section on the standardizing of undergraduate instruction of ophthalmology; a committee of three to report a scale of compensation for ocular injuries, and a committee of five to report on the use of various local anesthetics and on their effects on the eye.

During the meeting of the American Medical Association, the Air Service Medical Association of the United States was formed with the following officers: President, Col. John O. McReynolds, Dallas, Texas; first vice-president, Col. Theodore C. Lyster, Rockefeller Institute, New York City; second vice-president, Col. Eugene R. Lewis, Dubuque, Iowa; third vice-president, Col. Isaac H. Jones, Philadelphia, Pa.; fourth vice-president, Col. William H. Wilmer, Washington, D. C.; fifth vice-president, Col. Albert E. Truby, Washington, D. C.; secretary, Major John P. Gallager, Philadelphia, Pa.; council, Major James H. McKee, Philadelphia, Pa.; Major Frank Cary, Chicago, Ill.; Captain David H. Webster, New York City; Col. Casey A. Wood, Chicago, Ill.; Lt. Col. W. L. Sheep, Washington, D. C.; historian, Major E. C. Schneider, Mineola, Long Island, N. Y.; treasurer, Major Robert S. McCombs, Philadelphia, Pa.

The Philadelphia Medical Club, at its June reception, which was held in the ball room of the Bellevue Stratford Hotel, had as its guests of honor Senator Robert L. Owen of Oklahoma and the following foreign delegates to the American Medical Association: England — Lieut. Col. Sir Shirley Murphy, Sir Arbuthnot Lane, Rear Admiral E. R. Dimsey, Major W. Hey Groves, Sir St. Clair Thomson, Lieut. Col. Arthur F. Hurst, Dr. A. Graham Little. France—Professor P. Begouin and Professor R. Picqué, of Bordeaux, Major F. LeMaitre of Paris. Belgium—Professor Antoine DePage, Captain Van de Velde. China—Major S. T. Lee. Japan—Dr. S. Uchino.

Addresses of welcome were made by Dr. G. Oram Ring, president of the Club, and by Col. Edward Martin, Commissioner of Health of Pennsylvania, representing Governor Wm. C. Sproul. Responses were made by Sir St. Clair Thomson for England, Professor Le Maitre for France, and Senator Owen for America. A dinner to the guests of honor at the Union League by Dr. Ring preceded the reception.

MISCELLANEOUS.

We hope shortly to publish a complete list of the ophthalmologists in the Reserve Corps, with their active M. C. and inactive ranks.

Dr. Edward Van Cleve of New York states that forty-four state, private, and public school classes for the blind in ten cities of the United States enroll about 6,000 pupils.

Through the efforts of Dr. Jacob Bolotin, a blind heart and lung specialist of Chicago, a massage class has been organized consisting of six men and two women, selected from a large group of blind people.

The I. C. Railroad Hospital at Paducah, Kentucky, with an especially equipped operating room for eye, ear, nose and throat, and built at an expense of three hundred thousand dollars, will be completed about August first.

Dr. Frank Allport and Dr. James R. Smith of Chicago have had Hardy and Company make a very simple pair of spectacles for the detection of malingering. It consists in a plano lens on one side and a strong convex lens on the other. The frame has straight temples and a reversible nose piece.

The Court of Appeals of Kentucky reverses a judgment that affirmed an award of the Compensation Board for the loss of an eyeball the same as for the loss of sight of one eye. The Court considers that the loss of the eyeball is greater than the loss of sight of an eye and is entitled to more compensation.

Volume 1, Number 1, of Better Eyesight, edited by Dr. W. H. Bates of New York, is on our desk. Words fail us when an attempt is made to comment upon it. It is probable that it will have a following and that its teachings will find a receptive soil among people who dislike to wear glasses; but we are at a loss to understand upon what scientific basis an excuse for its existence can be offered.

An editorial in a recent number of the New York Medical Journal emphasizes to the medical profession at large the importance of recognizing the intimate relationship of ophthalmology to internal medicine. The article was inspired by listening to some papers which were read in the Ophthalmic Section of the Atlantic City meeting of the A. M. A.

The report of the Illinois Society for the Prevention of Blindness for February, March, April and May, shows that three doctors and one midwife were brought to trial for failure to report infection of the eyes of infants. Thirty-eight cases of ophthalmia neonatorum were reported to the Society. Twelve of these cases were referred to the Visiting Nurses' Association, twelve were taken to hospitals and two to a dispensary. Sixty-three cases of school-children with defective vision were referred to the Society. In fifty-one cases payment for glasses was made from the Lois Maxine Adler Fund. Twenty-eight other cases were referred to the Society with various eye defects.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

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Brailey, A. R. Examinations of Aviators. (Dis.) Amer. Jour. Ophth., v. 2, pp. 433-434.

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Ophthalmic Examining Instruments. (18 ill.) Zeitschr. f. Ophth. Optik, v. 3, pp. 83-90, 120-122; v. 4, 122-124, 154-160, 187-189.

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Wolffberg. Diagnostic Visual Tests. (1 ill.) Woch. f. Therap. u. Hyg. des Auges, v. 18, pp. 159-160.

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Onate, A. F. Cocain in Eye, Ear, Nose, and Throat Work. Rev. d. med. y. cir. Habaña, v. 23, p. 585.

Piesbergen, F., and Weiss, K. E. Strychnin in Ophthalmology. Woch. f. Therap. u. Hyg. des Auges, v. 20, p. 174.

Wolffberg. Dionin in Ophthalmology. Woch. f. Therap. u. Hyg. des Auges, v. 21, pp. 81-85.

Ocular Dressings. Woch. f. Therap. u. Hyg. des Auges, v. 21, pp. 209-210.

Therapeutic Significance of Glycerin-Tragacanth-Jelly. Woch. f. Therap. u. Hyg. des Auges, v. 19, pp. 61-63.

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